DOCUMENT RESUME

ED 273 802 CE 045 013

TITLE	A Guide to Job Analysis: A How-To Publication for Occupational Analysis.
INSTITUTION	Employment and Training Administration (DOL), Washington, D.C.
PUB DATE	Mar 82
NOTE	465p.
AVAILABLE FROM	Materials Development Center, Stout Vocational Rehabilitation Institute, Menomonie, WI 54751 ($12.00).
PUB TYPE	Guides - Non-Classroom Use (055)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Adults; Career Education; Employment Qualifications; *Job Analysis; *Job Skills; Job Training; *Occupational Information

ABSTRACT

Designed as a procedural manual for occupational analysts, this guide explains the job analysis approach used by the United States Employment Service (USES) system. Part 1 covers methodology and applications. Five chapters define job analysis terms and discuss major principles and applications of job analysis, conducting job analysis studies, writing job descriptions, organization charts, and workflow charts. Part 2 describes the job analysis components of work performed and worker characteristics. The three chapters on work performed address these components: worker functions, work fields, and materials, products, subject matter, and services. Seven chapters on worker characteristics focus on these components: general educational development, job training time and specific vocational preparation, aptitudes, interests, temperaments, physical demands, and environmental conditions. Part 3 is devoted to job analysis forms and procedures and their use within the USES. The staffing table, job analysis report, and narrative report are discussed, and samples/examples are provided. Appendixes include a job analysis study flowchart, task analysis, examples of job descriptions, and a workflow chart. A 39-page bibliography and an index are provided. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 273 802

A GUIDE TO JOB ANALYSIS

A "How-To" Publication for Occupational Analysts

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
RFry
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Printed and Distributed By:

Materials Development Center
Stout Vocational Rehabilitation Institute
University of Wisconsin-Stout

MDC

A GUIDE TO JOB ANALYSIS:

A "How-To" Publication for Occupational Analysts

Division of Occupational Analysis
United States Employment Service
Employment and Training Administration
U. S. Department of Labor

March 1982

FOREWORD BY MDC

A Guide to Job Analysis is the result of a U.S. Department of Labor project initiated in 1978 by the New York Occupational Analysis Field Center. This publication, the product of that research, was submitted to the U.S. Department of Labor by the Utah Occupational Analysis Field Center in March, 1982. As of December, 1982, DOL was still conducting review activities for the possibility of refining this publication.

After discussions with representatives of the U.S. Department of Labor, the Materials Development Center, who printed and disseminated the 1972 *Handbook for Analyzing Jobs*, decided to publish this book. The methodologies in *A Guide to Job Analysis* represent a major improvement in job analysis techniques that should be made available to all professionals using job analysis. However, due to printing restrictions by federal agencies, the U.S. Department of Labor has no current plans for publishing this book. Refinements after further DOL activities, if any, can be accommodated in a supplement.

Materials Development Center
Stout Vocational Rehabilitation Institute
University of Wisconsin-Stout

PREFACE

The importance of job analysis in our economy is increasing rapidly. It is essential for objectively analyzing the content of jobs and describing work in a standardized and easily understood manner. The job description, often a product of the job analysis process, is commonly used to provide information to new workers as well as to management. It is the basic document for employee orientation and job evaluation. Job matching is greatly facilitated by the use of standardized, quality job descriptions developed through job analysis. Occupational coding systems, which form the basis for job matching strategies, have their roots in job analysis. As jobs change and become more varied and complex, the use of job analysis remains vital in the development of training programs, in the preparation of career information for job seekers, and in the adaptation of tasks and equipment to the capabilities of the handicapped. Job analysis is also an integral part of developing culturally unbiased occupational tests and restructuring jobs for various purposes.

The 1972 *Handbook for Analyzing Jobs* was designed as a procedural manual for occupational analysts. Based on experience gained from using that handbook, certain changes were determined to be needed. Therefore, it has been revised and expanded to meet those identified needs. Also, refinements have been made in the techniques; a modification of the interest factors resulted from research by the United States Employment Service (USES), Division of Testing; and terminology for some job analysis components and factors has been revised to be more descriptive. This document, more appropriately called a guide, has been expanded to more fully explain the job analysis approach used by the USES system and to make it more useful.

A Guide to Job Analysis is divided into three sections: the first covers methodology and applications; the second describes the job analysis components of Work Performed and Worker Characteristics; and the last is devoted to job analysis forms and procedures, and their use within the USES.

The guide was planned and coordinated by Lawrence Ruscher, Supervisor of the New York Occupational Analysis Field Center, under the direction of the USES Division of Occupational Analysis. Acknowledgement is given to Jesse Behrens of the New York Field Center who wrote most of the first five chapters and did much of the initial editing.

The final editing, lay out, and printing were done in the Utah Occupational Analysis Field Center under the supervision of Russell B. Bateson. J. Jeannine Farrington had the overall responsibility for publishing the volume; editing and formatting were done by Jerryl Carr; and Judith Adams did the phototypesetting.

The following individuals also participated at various stages of development of this guide:

Beatrice O'Bryant
A. E. Berndt
Maurice Hill
Anthony Matukonis
J. Edmond Phillips
Stanley Rose
Maxwell Rosenzweig
Mildred Barker
Norman Kalenson
David Knapp
Michael Lazor

Louis Mancinelli
Alvin Sachs
Ann Wagner
Phillip Morris
Robert Gardner
Michael Swaim
John Doyle
Julianna Safford
J. Frederick Johnsen III
Phil M. Leigh
Wayne Olsen

Acknowledgement is given to the Occupational Analysts of all of the Occupational Analysis Field Centers (OAFC's) and to the Division of Occupational Analysis staff and others who completed questionnaires and prepared critiques of earlier drafts.

TABLE OF CONTENTS

PAGE

Preface iii

Part 1. Job Analysis Studies 1

Chapter

1. Concepts, Principles, and Applications of Job Analysis 5
2. Conducting Job Analysis Studies 19
3. Writing Job Descriptions 37
4. Organization Charts 61
5. Workflow Charts 77

Part 2. Job Analysis Components 91

Work Performed

Chapter

6. Worker Functions 95
7. Work Fields 121
8. Materials, Products, Subject Matter, and Services 163

Worker Characteristics

Chapter

9. General Educational Development 229
10. Job Training Time and Specific Vocational Preparation 247
11. Aptitudes 255
12. Interests 313
13. Temperaments 321
14. Physical Demands 331
15. Environmental Conditions 349

Part 3. Job Analysis Reports of the U.S. Employment Service 355

Chapter

16. Staffing Table 359
17. Job Analysis Report 371
18. Narrative Report 413

Appendixes 419

Bibliography 435

Index 477

PART 1

JOB ANALYSIS STUDIES

CHAPTER 1

CONCEPTS, PRINCIPLES, AND APPLICATIONS OF JOB ANALYSIS

Page

Definitions of Job Analysis Terms 5

The Job as a Concept 6

Dimensions of a Job: The Job Analysis Components 8

Applications of Job Analysis 14

CHAPTER 1

CONCEPTS, PRINCIPLES, AND APPLICATIONS OF JOB ANALYSIS

This chapter defines job analysis, the categories of information necessary for a complete analysis of a job, and related terms. It also covers the major principles and applications of job analysis. Later chapters describe ways in which these principles are applied.

Definitions of Job Analysis Terms

Job Analysis: In general, the gathering, evaluating, and recording of accurate, objective, and complete job data. Job analysis identifies and describes, in a systematic and comprehensive but succinct manner:

- *What* the worker does in terms of activities or functions.
- *How* the work is done—the methods, techniques, or processes involved, and the work devices used.
- *Results* of the work—the goods produced, services rendered, or materials used.
- *Worker characteristics* — the skills, knowledges, abilities, and adaptabilities needed to accomplish the tasks involved.
- *Context* of the work in terms of environmental and organizational factors, and the nature of the worker's discretion, responsibility, or accountability.

Establishment: A public or private employing unit that produces, provides, and/or sells goods or services at a single physical location. An establishment may range in size from a single self-employed worker to thousands of workers.

Work Activities: The physical actions and mental processes by which workers achieve an establishment's objectives.

Position: The work activities performed by one worker at one establishment.

Job: A single position or a group of positions, at one establishment, whose major work activities and objectives are similar in terms of worker actions, methodologies, materials, products, and/or worker characteristics; and whose array of work activities differs significantly from those of other positions.

Occupation: A group of jobs, found at more than one establishment, having work activities that are identical or related in terms of combinations of similar methodologies, materials, products, worker actions, and/or worker characteristics.

Task: A grouping of the elements and work activities of a job that have a common purpose, and are closely related in terms of methodologies, materials, products, services, and types and sequences of worker actions.

Element: The smallest step into which it is practicable to subdivide a work activity for purposes of a job description. It is the component of a task, but more comprehensive than individual motions of the worker.

The Job as a Concept

As an analyst gathers data on the work activities associated with the various positions at an establishment, the activities are at that point not yet identifiable as tasks or jobs. It is only after the data are collected, analyzed, and synthesized that the analyst is able to circumscribe jobs and their component tasks. This process is not based on an exact science, but rather on a series of judgments and estimates on the part of the analyst. Consequently, different analysts studying the same positions may identify the tasks differently. The process of identifying jobs among positions studied is described in Chapter 2, p. 30, and the process of breaking a job down into tasks is described in Chapter 3, p. 43.

Element, task, and job are relative concepts; that is, an activity that is an element in one job, could be a task in another job, and could conceivably be a job in and of itself. Figure 1 illustrates this point. "Slices cold meats and cheese" is an element of a Short Order Cook, a task of a Sandwich Maker, and the total job of a Deli Cutter-Slicer.

FIGURE 1
Job, Task, and Element as Relative Concepts

JOB TITLE	SHORT ORDER COOK	SANDWICH MAKER	DELI CUTTER-SLICER
JOB	Prepares and cooks to order, food requiring short preparation time	Prepares sandwiches	Slices cold meats and cheese by hand or machine
TASK	Prepares sandwiches	Slices cold meats and cheese by hand or machine	
ELEMENT	Slices cold meats and cheese by hand or machine		

For most purposes jobs should be described as they exist at the time they are studied. They should not include work activities that are now obsolete, nor those that are planned for the future. However, this does not mean to include only those work activities which are observed or performed during the time of the study. Take into account the time span of the job's work activities. Many jobs, such as those in industrial settings, have work activities which are performed in one day or less. Others, such as professional jobs, may have work activities that span many months. The work activities to be studied include all those that are the responsibility of the worker, regardless of how much time has elapsed since they were last performed. Whether or not a work activity is finally included in the job description depends on its importance to the total job and the percentage of the worker's time spent on it.

Work activities must also be described as they are expected to be performed according to the policies, procedures, and standards of the establishment being studied. Although an analyst observes a work activity and gathers information about it, it must be verified that (1) it is sanctioned by management as being an officially assigned part of the job, and (2) it is being performed in a standardized or otherwise acceptable manner. Also, do not view as part of the job any activities that the worker is not required to perform, such as the voluntary performance of activities of other jobs, even if such conscientiousness on the part of the worker is looked upon favorably by management.

Job analysis is not a study of workers, but of their activities and the requirements to perform them. It is irrelevant to an analyst if one worker is a college graduate and another is a high school dropout. However, it is relevant if the work activities require knowledges and abilities acquired from a college education. It is vitally important to make the distinction between studying a worker and studying the work activities that comprise a job.

It is also important that job titles do not lead the analyst into making assumptions about job duties or requirements. Job titles are often misleading. Additionally, it is not unusual for one title to cover a number of jobs or for the same job to be known by different titles.

It is helpful to keep clear the distinction between what the worker does and what gets done. This is especially true of machine jobs and work done by teams, crews, or committees. What machines and equipment do, in terms of jobs, is what gets done. Workers push buttons, pull levers, or push treadles so that machines will accomplish various purposes, such as drilling, sawing, or casting. It is important that a description of the machine's actions is not substituted for the actions of the worker. The inner workings of a machine are irrelevant unless the worker must deal with them, such as to repair or maintain the machine. Do not confuse the role of a worker taking part in a meeting with the purpose of the meeting itself. For instance, many health-team members, such as nurses, therapists, aides, and physicians, attend meetings to decide the medical treatment of patients. However, the activities of the participants might vary, with the aide giving information, the nurses and therapist giving and obtaining information and recommending treatments, and the physician receiving and giving information and deciding upon the treatment.

Dimensions of a Job: The Job Analysis Components

All job analysis methods require that certain categories of information about jobs be collected, analyzed, and recorded in a systematic way. The method used by the United States Employment Service (USES) recognizes two major types of job information: the Work Performed and the Worker Characteristics. The specific categories of information under each are the Job Analysis Components. Each job analysis component has a specific number of factors, which are defined subcomponents. One or more factors assigned to a given job or work activity is an estimated rating made by the analyst, based on an application of the definitions of the factors to the activities and requirements of the job.

Work performed (see Chapters 6-8) includes those job analysis components that relate to the actual work activities of a job. The work performed components are:

- Worker Functions
- Work Fields
- Work Devices
- Materials, Products, Subject Matter, and Services (MPSMS)

The work performed components will be referred to in Chapter 3 as the four categories of information that should be reflected in the job summary and the body of a well written job description.

Sentence analysis is a technique of integrating the work performed components in collecting, recording, and evaluating job data. Sentence analysis provides a framework for expressing the work performed components in a standard, concise form which summarizes a job or a task in a single sentence. Use of this technique makes it easier for an analyst to collect complete job information, to assign correct ratings for the ratable work performed components (worker functions, work fields, and MPSMS), and to write the job summary section of the job description. The technique involves organizing the work performed in the following framework: an implied subject (the worker), a verb, object, and modifying infinitive phrase. Examples of the application of sentence analysis are shown in Figure 2. Its application to the preparation of job summaries is discussed in Chapter 3.

FIGURE 2
Sentence Analysis Technique

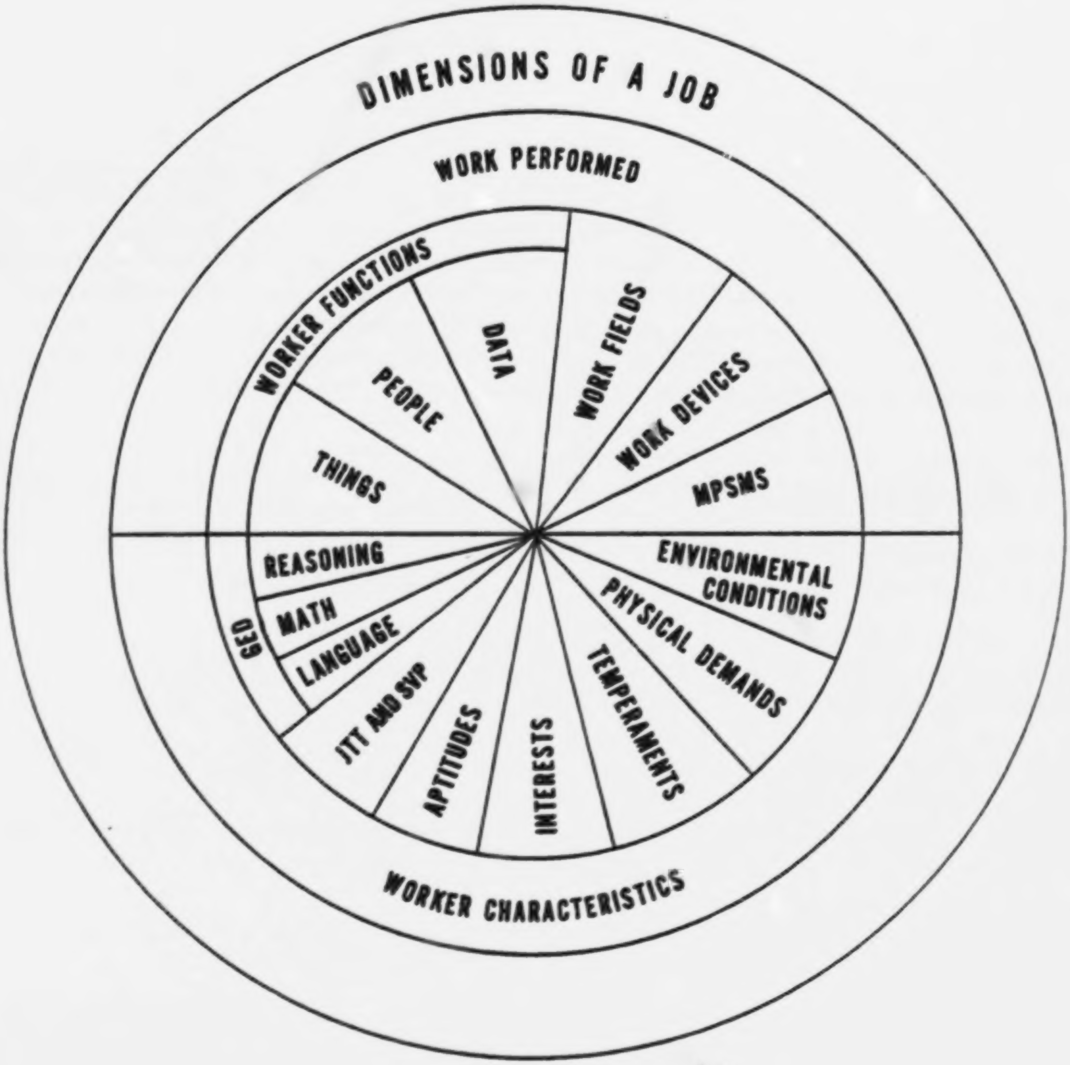
What Does the Worker Do?		**Why Does the Worker Do It? What Gets Done?**	**What is the Final Result or Technological Objective?**
Worker Action		**Purpose of the Worker Actions**	**Materials, Products, Subject Matter and/or Services**
(Worker Function)	**(Work Devices, People or Information)**	**(Work Field)**	**(MPSMS)**
		Infinitive Phrase	
Verb	**Direct Object**	**Infinitive**	**Object of the Infinitive**
Sets up *(setting up)*	various types of metal-working machines *(work device)*	to machine *(machining)*	metal aircraft parts. *(material)*
Persuades *(persuading)*	customers *(people)*	to buy *(merchandising)*	automobiles. *(product)*
Interviews *(analyzing)*	clients *(people)*	to assess *(advising-counseling)*	skills and abilities. *(subject matter)*
Drives *(driving-operating)*	bus *(work device)*	to transport *(transporting)*	passengers. *(service)*

Worker characteristics (see Chapters 9-15) include those job analysis components which reflect worker attributes that contribute to successful job performance, with regard to the work activities themselves and the environment in which they are performed. The worker characteristics components are:

- General Educational Development (GED)
- Job Training Time (JTT) and Specific Vocational Preparation (SVP)
- Aptitudes
- Interests
- Temperaments
- Physical Demands
- Environmental Conditions

Figure 3 depicts the work performed and the worker characteristics job analysis components, which define the dimensions of a job.

FIGURE 3


DIMENSIONS OF A JOB
WORK PERFORMED
WORKER FUNCTIONS
DATA
PEOPLE
THINGS
WORK FIELDS
WORK DEVICES
MPSMS
ENVIRONMENTAL CONDITIONS
PHYSICAL DEMANDS
TEMPERAMENTS
INTERESTS
APTITUDES
JTT AND SVP
GED
REASONING
MATH
LANGUAGE
WORKER CHARACTERISTICS

Work Performed Components

Worker Functions are the ways in which a job requires the worker to function in relation to data, people, and things, as expressed by mental, interpersonal, and physical worker actions. For purposes of job analysis, a total of 24 worker functions have been identified and organized as follows:

	Data		People		Things
0	Synthesizing	0	Mentoring	0	Setting Up
1	Coordinating	1	Negotiating	1	Precision Working
2	Analyzing	2	Instructing	2	Operating-Controlling
3	Compiling	3	Supervising	3	Driving-Operating
4	Computing	4	Diverting	4	Manipulating
5	Copying	5	Persuading	5	Tending
6	Comparing	6	Speaking-Signaling	6	Feeding-Offbearing
		7	Serving	7	Handling
		8	Taking Instructions-Helping		

Any job can be assigned the three worker functions that best characterize the worker's primary involvement with data, people, and things. Also, the overall predominance of data, people, and/or things can be indicated. These estimates provide useful information about the work performed. This job analysis component is fully discussed in Chapter 6.

Work Fields are groupings of technologies and socio-economic objectives that reflect how work gets done and what gets done as the result of the work activities of a job, or, in other words, the purpose of the job. They may be based on specific technologies, such as Electroplating and Abrading; on overall social objectives, such as Accommodating and Health Caring; on the type of object dealt with, such as Animal Propagating and Plant Cultivating; or on combinations of specific related technologies, such as Machining and Structural Fabricating-Installing-Repairing. The 94 work fields are defined and discussed in Chapter 7.

Work Devices are the machines, equipment, tools, and work aids used by the worker to carry out the specific activities of the job, and are defined as follows:

- *Machines and Equipment* are devices which are combinations of mechanical parts with the framework and fastenings to support and connect them, designed to apply a force to work on or move materials, process data, generate power, communicate signals, or have an effect upon material through the application of forces or agents, such as light, heat, electricity, steam, chemicals, or atmospheric pressure. They may be actuated by hand or foot power applied through levers or treadles, or by any outside power source, such as electricity, steam, or compressed air. Examples are printing presses, drill presses, casting machines, forging machines, conveyors, hoists, locomotives, automobiles, adding machines, typewriters, ovens, stills, forges, cameras, generators, switchboards, radio transmitters, and signal-light systems.

- *Tools* are hand-held implements which are used to change or move materials. Included are all common and special-purpose handtools, and those used by the worker and actuated by outside power sources, such as electricity or compressed air. Examples of the latter are pneumatic hammers, cutting torches, paint spray guns, electric screwdrivers, and electric cutters.
- *Work Aids* are miscellaneous items which cannot be considered as machines, equipment, or tools, and yet are necessary for carrying out the work. Included are securing devices, such as jigs, fixtures, and clamps; measuring and weighing devices, mechanical and electrical, regardless of size; work instructions, including blueprints, sketches, maps, charts, wiring diagrams, work specifications, written instructions, and procedural manuals; and musical instruments.

This job analysis component, although not discussed in a separate chapter, is mentioned in Chapters 2 and 3 in conjunction with studying jobs and preparing job descriptions.

Materials, Products, Subject Matter, and Services (MPSMS) include (1) basic materials being processed, such as fabric, metal, and wood; (2) final products being made, cultivated, harvested, or captured, such as wild animals, sponges, field crops, trees, and automobiles; (3) data, when being dealt with or applied, such as in economics and physics; and (4) services being rendered, such as barbering and dentistry. A classified listing of MPSMS categories appears in Chapter 8, where this job analysis component is fully discussed.

Worker Characteristics Components

General Educational Development (GED)is education of a general nature which contributes to the reasoning development and the acquisition of mathematical and language skills that are required of the worker to achieve average satisfactory job performance. GED is estimated on the basis of three discrete scales for reasoning, mathematical, and language development and is discussed in Chapter 9.

Job Training Time (JTT) and Specific Vocational Preparation (SVP) is the usual amount of time spent by the average worker in acquiring information, learning the techniques, and developing the facility for acceptable performance in a specific job, occupation, or field of work. JTT consists of the cumulative time spent in one or more of the following:

- High school courses
- Vocational courses
- College courses
- Apprenticeship
- Inplant training
- On-the-job training
- Performance on related jobs

SVP is specific spans of JTT ranging from a short demonstration to over 10 years. JTT and SVP are discussed in Chapter 10.

Aptitudes are the specific abilities required of an individual to perform a given work activity. Below are the 11 aptitudes included in this component; they are defined and discussed in Chapter 11.

G - General Learning Ability
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity
E - Eye-Hand-Foot Coordination
C - Color Discrimination

Interests are a liking or having a preference for an activity. Twelve factors, defined and discussed in Chapter 12, have been identified which represent the vocational interests of individuals. These factors are:

01 Artistic
02 Scientific
03 Plants and Animals
04 Protective
05 Mechanical
06 Industrial
07 Business Detail
08 Selling
09 Accommodating
10 Humanitarian
11 Leading-Influencing
12 Physical Performing

Temperaments are the adaptability requirements made on the worker by specific types of jobs. This component consists of the following 11 factors, which are defined and discussed in Chapter 13.

D - *DIRECTING* activities
R - Performing *REPETITIVE* tasks
I - *INFLUENCING* people
V - Performing a *VARIETY* of tasks
E - *EXPRESSING* personal feelings
A - Working *ALONE*
S - Working under *STRESS*
T - Attaining *TOLERANCES*
U - Working *UNDER* specific instructions
P - Dealing with *PEOPLE*
J - Making *JUDGMENTS* and decisions

Physical Demands are the physical capacities required of the worker to perform assigned tasks. The 28 physical demands factors, defined and discussed in Chapter 14, are:

1. Standing
2. Walking
3. Sitting
4. Reclining
5. Lifting
6. Carrying
7. Pushing
8. Pulling
9. Climbing
10. Balancing
11. Stooping
12. Kneeling
13. Crouching
14. Crawling
15. Reaching
16. Handling
17. Fingering
18. Feeling
19. Talking
20. Hearing
21. Tasting/Smelling
22. Near Vision
23. Midrange Vision
24. Far Vision
25. Depth Perception
26. Visual Accommodation
27. Color Vision
28. Field of Vision

In addition to the above factors, there are five Degrees of Strenuousness which are defined in terms of some of the strength-related factors. The one whose definition most closely matches the physical requirements of a job is the overall physical demands rating for that job. The degrees of strenuousness are:

S - Sedentary Work
L - Light Work
M - Medium Work
H - Heavy Work
VH - Very Heavy Work

Environmental Conditions are the specific physical working conditions to which the worker is exposed while performing assigned tasks. The 14 environmental conditions, defined and discussed in Chapter 15, are:

1. Exposure to Weather
2. Extreme Cold
3. Extreme Heat
4. Wet and/or Humid
5. Noise
6. Vibration
7. Atmospheric Conditions

Inherent Hazards:

8. Moving, Mechanical Parts
9. Electric Shock
10. High, Exposed Places
11. Radiant Energy
12. Explosives
13. Toxic or Caustic Chemicals
14. Other

Applications of Job Analysis

Job analysis is the technique used for obtaining and presenting factual job information. This information is the basis for many decisions made each day by industry, government and private agencies, and employee organizations concerning many programs.

Many of the procedures and techniques of job analysis were developed to fill occupational information needs of various manpower programs of the public employment service. However, they are applicable to many programs regardless of the intended use of the data. Some of the major applications of job analysis are briefly described below.

Applications Using USES Job Analysis Components

The primary applications of the USES job analysis components are the classification and description of occupations as presented in the *Dictionary of Occupational Titles*[1] (DOT). This publication provides meaningful and accurate data for job matching and a classification system useful for statistical reporting. The occupational definitions found in the DOT are derived from job analysis data and are used in placement, vocational counseling, curriculum planning, and vocational rehabilitation. These occupational definitions are widely used by government and private agencies, industry, the military, and schools and colleges.

Two publications, related to the DOT, which use job analysis data, components, and/or concepts are also useful in recruitment, placement, training, and vocational counseling. The *Guide for Occupational Exploration*[2] (GOE), uses interest areas as the basis of its structure. The *Selected Characteristics of Occupations Defined in the Dictionary of Occupational Titles*[3] is a supplement to the DOT and contains job analysis ratings for specific vocational preparation (SVP), mathematics and language development, and physical demands and environmental conditions for occupations listed in the DOT. It is used for rehabilitation programs by agencies, such as the Social Security Department's Division of Disability Determination. Additionally, numerous USES career guides and brochures, which are based on job analysis data, are used in career planning and job matching.

Some types of job analysis studies require that each task be described in detail and analyzed individually for various job analysis factors as if it were a job in itself. This technique, known as task analysis, is used for such objectives as developing and validating occupational tests, designing and updating vocational curriculums, and restructuring jobs. Various task-analysis forms can be devised for specific studies. The format in which the task-analysis data is presented is usually similar to that of a job description: identifying information, summary, body, and worker requirements. The job analysis factors for which each task is rated depends on the purpose of the study.

---

[1] *Dictionary of Occupational Titles* (4th ed., Washington: U.S. Department of Labor, 1977).

[2] *Guide for Occupational Exploration* (Washington: U.S. Department of Labor, 1979).

[3] *Selected Characteristics of Occupations Defined in the Dictionary of Occupational Titles* (Washington: U.S. Department of Labor, 1981).

Job restructuring is a special application of job analysis that involves the identification of jobs within the context of the system of which they are a part and the analysis and rearrangement of their tasks to achieve a desired purpose, such as alleviating skill shortages, creating entry-level jobs, improving career ladders, reducing business costs, and achieving fuller and more efficient use of manpower. Task analysis is a major step which allows consideration for restructuring jobs by rearranging or otherwise revising tasks according to their job analysis ratings. This, along with other factors, such as workflow and plant layout, provides a basis for revising the content of jobs and/or creating new jobs. The job restructuring methodology of the U.S. Employment Service is fully described in the *Handbook for Job Restructuring.*[4] An example of a task analysis from *An Application of the Labor Department's Job Restructuring Methodology to Physical Therapy Activities,*[5] an actual job restructuring study, appears in Appendix B, p. 420.

A job specification is a written record of the hiring requirements of a job in a particular establishment, based on a firsthand analysis of the job. It includes a description of the major tasks of the job and various hiring requirements, such as the qualifications required for job performance, the physical demands and environmental conditions of the job, and other job factors which may affect an applicant's ability to perform or willingness to accept the job. Job specifications are useful tools for employee selection, especially for jobs with frequent openings; jobs requiring some degree of skill for which large numbers of applicants must be screened; jobs that are difficult to fill; jobs in which physical demands and/or environmental conditions are important selection factors; and jobs requiring test-selected referrals. Job analysis is a critical step in the preparation of a job specification because the identification and description of the major tasks of the job depend upon a careful analysis, since many of the selection factors in the job specification relate directly to one or more of the tasks. Job specifications are very useful in affirmative action plans. A good example of the use of job specifications in affirmative action is a study conducted at Wagner College, Staten Island, N. Y., which is described in *The Job Analysis Approach to Affirmative Action.*[6]

Other uses of the USES job analysis components include alien certification studies and skill comparability studies, both of which emphasize detailed task descriptions and job training time information.

---

[4] *Handbook for Job Restructuring* (Washington: U.S. Department of Labor, 1970).

[5] *An Application of the Labor Department's Job Restructuring Methodology to Physical Therapy Activities* (New York: Occupational Analysis Field Center, New York State Department of Labor, 1977)

[6] Berwitz, Clement J., *The Job Analysis Approach to Affirmative Action,* Wiley-Interscience, John Wiley & Sons, New York, 1975.

Alien certification studies are sometimes required when an establishment applies to the Employment Service for permission to hire foreign workers for certain jobs for which there are insufficient numbers of qualified workers in the labor market and for which inexperienced workers cannot be readily trained. The jobs are analyzed in detail to verify that they are accurately represented by the employer and that the training time justifies certification of alien workers.

Skill comparability studies may be necessary when an establishment or industry engaged in production of a product considered essential to the nation, such as for national defense, petitions the U.S. Government to establish tighter controls on competing imports which are threatening the continued production of that product. Representative jobs are studied as well as related jobs that require similar skills to produce nonessential versions of the same product (e.g., miniature ball bearings used in ballistic missiles vs. nonminiature ball bearings for general industrial use). Both categories of jobs are analyzed in detail and compared as to similarity of skills, lengths of training time, and the amount of time required to train workers converting from one set of skills to the other.

Other Applications of Job Analysis Information

Another major use of job analysis information is to provide a data base for job evaluation programs. Job evaluation is the application of a rating method to objectively and reliably determine the relative money value of individual jobs in an establishment. There are several job evaluation methods in use, all of which require that jobs first be carefully analyzed and job descriptions prepared, including detailed information on worker characteristics. The job analyses enable the evaluators (usually a committee) to obtain a thorough knowledge of each job, from the standpoint of the factors upon which the value of the job is based.

Job analysis information has many other uses in the public and private sectors, such as in occupational health and safety programs, labor cost management, industrial engineering, and worker performance appraisal.

CHAPTER 2

CONDUCTING JOB ANALYSIS STUDIES

Page

Preparing for Job Analysis Studies 19

Conducting Job Analysis Studies 24

CHAPTER 2

CONDUCTING JOB ANALYSIS STUDIES

This chapter describes how to prepare for and conduct job analysis studies. It contains procedures for objectively getting complete and accurate job information. Although these procedures have been developed for the occupational research program of the U.S. Employment Service, they can also be used by others. (A job analysis study flowchart appears in Appendix A, p. 119.)

Preparing for Job Analysis Studies

Researching the Industry

Research the assigned industry and become familiar with its terminology, processes, work methods, materials, products, machines, equipment, and key occupations. This will aid in talking intelligently with establishment officials and workers and in gathering and evaluating information effectively. There are many information sources that can be used. State Employment Service offices may provide local labor market data, job descriptions, and hiring requirements; and their staff can often initiate contacts with establishment officials. Technical literature and related occupational and industrial information is available at libraries and from other sources, such as trade unions, associations, professional societies, and government agencies. The *Dictionary of Occupational Titles*[1] provides titles and descriptions for most jobs in the economy, including an arrangement of occupational titles by industry. The *Standard Industrial Classification Manual*[2] is another source of information about industry classification and the types of establishments that comprise each industry.

There are many directories which are helpful in identifying and locating trade unions, associations, and professional societies. A comprehensive directory is the *Encyclopedia of Associations, Volume I*[3]. Others are the *National Trade and Professional Associations of the United States*[4] and the *Directory of National Unions and Employer Associations.*[5]

---

[1] *Dictionary of Occupational Titles* (4th ed., Washington: U.S. Department of Labor, 1977).

[2] *Standard Industrial Classification Manual* (Washington: Executive Office of the President, Bureau of the Budget, 1972).

[3] *Encyclopedia of Associations, Vol. I: National Organizations of the U.S.* (13th ed., Detroit: Gale Research Co., 1979).

[4] *National Trade and Professional Associations of the United States* (Washington: Columbia Books).

[5] *Directory of National Unions and Employer Associations* (Washington: U.S. Department of Labor, 1975; Supplement, 1978).

Selecting Establishments

The occupational research program of the U.S. Employment Service requires that job analysis studies be done in a number of establishments representing key segments of all industries. While engaged in industry research, prepare a list of establishments for job-study consideration.

Trade unions, associations, and societies are sources for establishment names and titles of their officials. Other sources for job-study leads include industrial directories, such as the *Thomas Register of American Manufacturers*[6] and *the MacRAE's Industrial Directories*,[7] that list establishments by name, industry, and geographic location; and the classified (yellow) pages of telephone directories. Selecting an establishment for job study from a prospective list is based on the following factors:

- Purpose of the job study.
- Type of product or service.
- Number of employees.
- Number of representative industry jobs likely to be found in the establishment.
- Location of the establishment.
- Policy or history of the establishment in allowing studies of various kinds.

Contacting Establishments

Contact the prospective establishments by letter or telephone to arrange for a conference with establishment officials. The initial contact should be with a high-level official, to help ensure cooperation of lower level personnel. Some officials require a written request and some form of identification from the analyst before an initial meeting is considered.

In contacting an establishment that is a division or subdivision of a national or international organization, it may be necessary to send a letter to the organization's corporate headquarters outlining the nature and purpose of the study. Permission from corporate headquarters to conduct a job study usually results in cooperation from local establishment officials. The decision whether to contact an establishment directly or to contact the corporate headquarters should be based on available information on the autonomy of the establishment. It is especially advisable to contact corporate headquarters if job studies will be in more than one establishment in the corporation.

---

[6] *Thomas Register of American Manufacturers*, 14 vols. (New York: Thomas Publishing Company, published yearly).

[7] *MacRAE's Industrial Directories*, (Plainview: MacRAE's Blue Book, Inc., published yearly).

Meeting Initially with Establishment Officials

The objectives of the initial meeting are:

- To explain the aim and scope of the proposed study to establishment officials and to demonstrate how the resulting data can be useful to them as well as to the analyst's research program.
- To obtain authorization for the study.
- To gather preliminary information needed to plan for the study.

Explain the uses of current and detailed job analyses as valuable tools for personnel management and industrial-relations functions, such as recruitment and use of staff, wage evaluation, employee appraisal, worker safety and health, and inplant training programs. Examples of job analysis studies are useful when explaining the value of such reports to establishment officials.

Be prepared to estimate the duration of the study and its effects on production activities, based on experience in previous studies. Inform officials of the study time estimate after sufficient staffing information is obtained. When time limits are imposed by the officials, suggest the assistance of additional analysts, if available, to reduce study time, or select jobs that can be studied within the time allocated. Assure officials that workers will not be interrupted without prior permission; that interviews with line supervisors will be arranged at their convenience; and that observations of workers will be made in an unobtrusive manner. Frequently, plant managers and department heads are brought into the discussion of the various aspects of the proposed job study to determine its impact, feasibility, and potential benefits. Inform officials that the job analysis data will be submitted to them for review to insure accuracy and completeness of the information. Never disclose confidential information about other establishments studied, such as processes, machines and equipment. Never make recommendations on how to improve work methods or job performance.

Arranging for an Authorized Study

When permission for the study has been obtained, the following steps should be taken:

- Request that an establishment official inform workers, through supervisors or bulletin board notices, about the purpose and dates of the study and the name of the analyst.
- Request notification of, or arrange a meeting with, shop stewards and other union officials to explain the study to help ensure acceptance and cooperation. Emphasize that workers' performance will not be evaluated nor will work methods be criticized.

- Establish ground rules that officials feel are necessary for safety, security, and minimal disruption to workers. Examples of ground rules are: observe workers from a distance; avoid entering restricted areas; adhere to rules covering confidentiality of forms and documents; wear safety equipment; and keep designated personnel informed of whereabouts.

- Determine an establishment official to maintain contact with during the study.

- If possible, arrange for workspace, such as a desk or table apart from the work area, where notes can be reviewed, organized, and rewritten to determine if the data collected is understandable and complete.

Obtaining Establishment Data to Facilitate Job Analysis

When possible, obtain copies of establishment job descriptions; employee training manuals; employee handbooks; union contracts; product samples and catalogs; company pamphlets and annual reports; organization, workflow, and plant-layout charts; blank or completed copies of key forms, such as work orders, production reports, product specification sheets, job guides, and instructions; and departmental work schedules. These documents are used in preparing the establishment organization and workflow charts and the narrative report.

Organization and workflow charts provide information about the establishment in concise and graphic format. They supplement job data and add perspective in order to better describe the interrelationships among individual jobs. The narrative report and charts contain occupational and industrial information which is not included in the job analysis reports. They serve to present data about the establishment as a whole that would otherwise remain fragmented or unreported. Organization and workflow charts are fully discussed in Chapters 4 and 5; the preparation of narrative reports is discussed in Chapter 18.

Preparing a Preliminary Staffing Table

A staffing table is a systematic arrangement of data indicating the distribution of jobs and workers in each department of the establishment. It includes establishment job titles, identification of entry jobs, and numbers of workers in each title by work shift. Data for the staffing table, an important aid in planning the job study, may be obtained at the initial meeting. This information may be obtained from computer printouts, payroll records, job descriptions, and departmental staffing and organization records and charts. In smaller establishments, the information may be obtained orally from the officials. An example of the staffing table format used by the U.S. Employment Service appears on pp. 364-365.

Taking the Establishment Tour

During the initial meeting, make arrangements for an establishment tour prior to beginning the actual analysis of jobs. This is highly desirable in order to obtain a picture of the overall operations and to become familiar with the processes, machines, equipment, establishment layout, and environmental conditions. The knowledge gained from such a tour assists in planning an approach to the study. At a manufacturing establishment, the tour should preferably start where the purchased raw materials and components are received and follow the sequence of the process flow. At a nonmanufacturing establishment, the tour should start at the point where the flow of work begins. Ask the official conducting the tour to describe and explain the activities of each organizational unit. If possible, take notes during the tour. Notes should reflect basic descriptions of visible aspects of work processes, worker activities, and environmental conditions. In situations where note-taking is not practical, record relevant observations from memory at the first opportunity. Tours sometimes provide the opportunity for the analyst to meet unit and department supervisors who will be involved in the study and to secure staffing data not previously obtained.

After the initial meeting or orientation tour, review the agreed upon arrangements, guidelines, and tentative starting date with officials. Telephone the establishment official shortly before the start of the study to confirm the availability of participating personnel and the reporting time and place.

Conducting Job Analysis Studies

Establish a Job Analysis Study Schedule

Meet with the establishment contact official upon arrival at the establishment to begin the study. Together, review the staffing table, agree on selection of jobs to be studied, identify the departments and units in which they are found, and agree on a plan that sets the sequence of the jobs to be studied and the approximate time needed in each location. It may be preferrable to study jobs in order of work flow or by level of skill (lower skilled jobs first). This often permits progressive acquisition of knowledge of processes, machines, and techniques and facilitates the study of the more complex, higher level jobs. For example, studying a production-line job prior to studying a quality-control inspector job can provide a better understanding of the kinds of defects that occur.

Officials frequently arrange a meeting of the department heads and supervisors to introduce the analyst and explain the study objectives. Review the study schedule during the meeting to confirm the availability of cooperating staff for the time periods indicated, answer questions, and resolve anticipated problems. Some establishment officials prefer to have the analyst meet individually with each department head and unit supervisor prior to studying the jobs. Inform the supervisor of the job-study methods to be used to determine any necessary restrictions or modifications. Assure supervisors that job analysis data developed will be reviewed with them for completeness and accuracy.

Ask line supervisors or department managers to identify, for interview, representative workers who are fully trained, of average proficiency, and who are likely to be cooperative and able to understand and respond to questions relating to their jobs. In addition, permission could be requested to observe, but not interview, additional workers to obtain data on task variations of the same job.

Categories of Required Job Information

During job studies, be aware of the categories of job information to be collected. The Job Analysis Report used by the USES (fully discussed in Chapter 17) requires the following data:

- The specific worker actions in relation to data, people, and things (worker functions).
- What gets done in terms of methods, procedures, processes, techniques of using basic skills, and objectives of the job (work fields).
- The materials used, products produced, subject matter dealt with, and services rendered (MPSMS).
- The machines, equipment, tools, and work aids used (work devices).
- General educational development in terms of levels of reasoning, mathematics, and language (GED).
- Vocational preparation in terms of vocational schooling, prerequisite work experience, and on-the-job training, collectively reflecting job training time (JTT) and specific vocational preparation (SVP).
- Aptitudes.
- Interests.
- Temperaments.
- Physical demands and environmental conditions.

Job Analysis Methods

There are several different methods for collecting job analysis data. Some of the more commonly used methods are:

- *Questionnaires.* Prepared questionnaires are administered to numbers of workers to compile information on the various work activities performed. Preparation of questionnaire items requires the analyst to have considerable knowledge about the activities of the establishment and its jobs. An example of a widely used questionnaire is the Position Analysis Questionnaire (PAQ) developed by McCormick at Purdue University.[8] The procedure for use of the PAQ requires familiarization with the job through prior knowledge, interview, and/or observation; it is used primarily for job evaluation and for aiding in the development of aptitude requirements of jobs.

- *Work Diaries or Logs.* Each worker studied records, on log sheets, a brief description of each activity performed and the time of performance, during a specified period of time or during representative or randomly selected periods.

- *Task Inventories.* The worker checks those tasks performed and the frequency of performance on a checklist of tasks. Like the questionnaire, this method requires a comprehensive study of the activities of the establishment (or field of work) in order to prepare the inventories. Published task inventories are available for use in studying jobs in several occupational areas.[9]

- *Position Descriptions.* Each worker prepares a description of his/her work duties and responsibilities. These descriptions will vary widely in format, comprehensiveness, clarity, and accuracy, according to the worker's intelligence, motivation, writing ability, and objectivity.

- *Observation.* The analyst observes the worker performing work activities at the jobsite. Note-taking is essential.

- *Interview.* The analyst questions the worker, supervisor, or other knowledgeable persons, at or away from the jobsite, to elicit information about the job. Note-taking is essential.

- *Group Interview.* The analyst questions groups of workers in the same job, during one or more sessions, to elicit job information. Although frequently difficult to arrange, a group interview saves time, encourages workers to think about and discuss the various aspects of their work activities, and provides a built-in check and immediate verification of the information through group consensus. The workers' supervisor may be included in group interviews.

- *Observation-Interview.* The analyst observes workers performing their activities and interviews workers, supervisors, and other establishment officials at the jobsite who have information pertinent to the jobs. It is recommended as a very objective method of job analysis because it:

---

[8] McCormick, Jeanneret, and Mecham, "A Study of Job Characteristics and Job Dimensions as based on the Position Analysis Questionnaire (PAQ)." *Journal of Applied Psychology*, Monograph Vol. 560, No. 1, August 1972.

[9] *Task Analysis Inventories*, (Washington: U.S. Department of Labor, 1973; Series II & III, 1980).

1. Involves firsthand observation.

2. Provides an opportunity to evaluate interview data and to sift essential from nonessential facts in terms of that observation.

3. Permits the workers to demonstrate as well as describe job functions.

In short, analysts observe individual workers performing work activities and take notes on the work performed and the work requirement factors. Workers are questioned as necessary to clarify or supplement data obtained through observation.

This method may primarily focus either on observation or interview. Certain types of jobs, such as professional ones, cannot be directly observed but must be studied primarily by interview. Other types of jobs, such as uninvolved industrial and service ones, can be more easily studied by observation and require relatively less interviewing.

Although the job analysis technique used and recommended by the U.S. Employment Service is based essentially on the observation-interview method, it is a flexible approach that incorporates other supplemental methods. These include questionnaires, work diaries, and task inventories, which are used preparatory to observation-interview or to verify data obtained by observation-interview.

Getting the Facts by Observation-Interview

The following is a detailed description of the usual basic procedures followed by Employment Service analysts in conducting studies by observation-interview. Note however, that flexible use of alternative or supplementary methods may be necessary in certain cases.

Taking Notes. Notes should be sufficiently detailed to enable preparation of job analysis reports without relying on memory. It is easier to disregard nonessential data than to reconstruct vaguely remembered tasks. While a good memory is a definite asset in job analysis studies, do not rely upon it too heavily. Rough sketches of machines, equipment, tools, work aids, materials, and products may reduce the volume of notes required.

Use of a camera or tape recorder as a data-gathering aid may be considered, but used only with the knowledge and consent of establishment officials. Proper observation-interview and note-taking techniques usually make it unnecessary to photograph, film, or record interviews with workers.

Preparing for the Observation-Interview. Inform the worker of the purpose of the study, emphasizing that the focus will be on how the job is performed and not on the worker's ability or proficiency. Establish a friendly but business-like relationship with the worker.

Be alert to the worker's reaction to being observed or interviewed. Although most workers can be expected to be slightly nervous — at least initially — while being studied, those who become upset, distracted, annoyed, belligerent, or uncooperative, should not be subject to continued study. Select, or ask the supervisor to select, other workers in the same job.

Do not discuss matters unrelated to job analysis, such as grievances, labor management conflicts, safety and health violations, and wage-classification problems. If a worker brings up such topics, tactfully steer the interview back to the analysis of the job. Avoid making comments or suggestions about improving workflow, plant layout, work methods, and the design of the jobs.

Observing and Interviewing the Worker. Jobs having sequential tasks are studied by observation and note-taking as the worker performs each task of the work cycle. Record questions on any aspect of the job not understood for later discussion with the worker or supervisor. Initial observation is considered complete when no additional data is likely to result from continued observation. Then interview the worker, preferably at the jobsite, or at some other location, if required by noise, safety, or other factors. Question the worker about observed activities and ask for a description or demonstration on activities where additional information or clarification is needed. Refer to the notes taken and summarize them to the worker to verify accuracy and completeness. Word questions in a way which will encourage the worker to respond in detail. Avoid leading questions and those that can be answered "yes" or "no." Most workers are proud to demonstrate and explain how their jobs are performed. Allow the worker to respond freely and interrupt only when necessary to obtain clarification or to regain control of the interview by steering the worker back to the subject at hand. Avoid unnecessary and repetitious questions and permit the worker to answer one question before being asked another. Rephrase questions the worker does not fully understand rather than repeat verbatim.

The observing and interviewing phases of a job study do not always follow in turn. The two may occur concurrently or on an alternating basis. Interviewing prior to observing the worker may be preferred to allow a better understanding of the basic job and to identify in advance the key aspects of tasks that warrant close attention. If possible, verify the job data compiled while studying one worker's job, with other workers doing the same job. This helps to correct discrepancies caused by the individual habits or techniques of the initially observed worker. Spend considerably less time with additional workers because the emphasis is on verifying tasks already studied and determining task variables that reflect true job requirements and not individual worker variations.

Interview the first-line supervisor, rather than the worker, when factors such as safety, high noise level, and language barriers hinder oral exchange of information; and when the supervisor is better able to describe and explain the job observed.

Insuring Completeness of Collected Data

Sometimes observation shows only a portion of the worker's activities because the total range of activities occurs over a period of several hours, days, weeks, or longer. Questioning often reveals that the worker performs many additional activities not seen during the observation phase. Some activities may be unobservable because of the work location, time of day (e.g., at the start and end of the work shift), or infrequency of performance.

The following are some examples of questions which may help make sure that complete data are collected:

- *Regarding work orders, instructions, and reports:* How do you get your work orders and instructions? What kind of forms or records do you use or keep? Can you show me the forms and indicate which entries you make? What do you do with the completed forms?

- *Machines, equipment, tools, and work aids:* What do you do when the machines or equipment develop mechanical trouble? What do you do with the machines or equipment at the start and end of your work day? When do you use the calipers I see in your shirt pocket? Who uses the oilcan, wrench, and rags I see on the machine ledge? When is that idle machine used and who uses it? What other tools do you use?

- *Supplies, materials, and finished products:* How do you get the supplies and materials to your jobsite? What do you do with your finished work?

- *Work activities and time percentages:* What other work do you do that I haven't seen, such as the things you do once in a while? How does your work vary from week to week? Would you please explain what you just did? Would you repeat your actions, but more slowly, so I can follow your motions? How often during the day do you perform this part of your job? How long does it take to complete that task?

- *Training and education:*

  Asked of establishment official or supervisor: What type of previous experience does the worker need to qualify for this job? What type and length of training does the new worker receive before you consider the worker capable of performing all required activites? What level of education is required? Why?

  Asked of the worker: How are your previous jobs similar to this job? How were you trained for this job? How long did the training last?

- *Physical demands and environmental conditions:* Although much of this information is gathered during the establishment tour and observation of the worker, specific data must be obtained through such questions as: How often do you lift that? How much does it weigh? How far do you carry it? How many times a day do you climb those steps? How do you know what color item to select?

- *Worker's use of judgment:* On all but the simplest jobs there is the often hidden dimension of the decision-making required of the worker. It is crucial that the basis of worker judgment is fully understood (e.g., knowledge, sensory input, memorized data) and is reflected in the written job description. This information can usually be obtained by interview rather than observation. Ask questions such as: Under what circumstances do you use one method (or tool, or piece of equipment) rather than another? What do you need to know in order to perform that activity? How do you know when the finished item doesn't meet standards? How do you know when you can take care of a problem rather than ask for assistance? How do you know what part of the machine needs adjustment? How much of your work do you perform from memory and to what extent do you refer to written instructions and manuals? What specifically do you need to know regarding the physical properties of the materials and the machines, equipment, and tools that you use? How can you tell by observation or feel that the product is ready? Why did you do that at that time?

Some Types of Jobs Are More Difficult to Study Than Others

It is often more difficult to study clerical, managerial, technical, and professional jobs than industrial jobs for the following reasons:

- Work activities are less observable; more reliance must be placed on in-depth interview than on observation.
- Work activities are usually nonsequential.
- Work spans are likely to be longer; therefore, work activities that are not only difficult to observe but which may not be performed at all during the period of the observation-interview, must be studied (e.g., preparation of monthly reports and participation in periodic meetings).
- Jobs are less likely to be as standardized as industrial jobs.
- Abilities of the incumbent worker often influence and shape the nature of work activities. The worker may be permitted to devise individual methods and techniques to accomplish job goals, resulting in a lesser degree of standardization and a unique combination of tasks.
- Determining the number of jobs among nonindustrial positions is difficult because of the variety of task combinations in each position.

Some difficulties in studying nonindustrial jobs can be reduced by the following approaches:

- Study the job at the jobsite, even though it may be essentially nonobservable, in order to see the work environment and to obtain a better understanding of the nature of the job.
- Review forms, procedures, and reports used by the worker and identify entries made or used by the worker, as opposed to other workers.

- Scrutinize the worker's appointment calendar, diary, logbook, or similar sources of information on the pattern and frequency of work activities over a period of time.

- Consider using the *Task Analysis Inventories.*[10] This publication can be an especially valuable data-gathering tool while studying essentially nonobservable jobs.

Determining the Number of Jobs Among Positions Studied

The identification of distinct jobs within an establishment is often one of the most difficult aspects of a job study. It is necessary to determine the number of jobs existing among groups of similar positions, because each job analysis report must represent one job.

There are three factors to evaluate when comparing the work activities of two or more workers to determine the number of existing jobs:

- *Similarity of Tasks.* Determine the extent to which the tasks are similar in terms of worker functions, work fields, MPSMS, work devices, JTT and SVP, GED, physical demands and environmental conditions, and degree of responsibility. If it is unclear that sufficient similarities exist in two or more positions, then prepare separate job analysis reports.

- *Relative Frequency (Time Percentage) of Similar Tasks.* The percentage of time in which a worker's activities are performed is of critical importance when comparing job activities of one worker against activities of other workers with similar task content, but with variations in frequency of performance. Therefore, workers performing the same activities are not necessarily performing the same job. Whether they are depends on the amount of time spent in each activity.

- *Rotation of Workers.* Where workers regularly rotate (interchange) from one set of activities to another, the activities should be analyzed collectively as a single job, since all activities are performed by all workers with similar frequency. Rotation can occur at various intervals such as, hourly, daily, weekly, monthly, or yearly.

  Rotation is not limited to workers having jobs with relatively short work spans and noncomplex activities, although it may be less obvious when it occurs among workers who perform numerous complex activities over longer periods of time. Recent studies of physical therapists, for example, revealed that some rehabilitation hospitals rotate therapists to different specialized treatment units every 6 to 12 months, with a somewhat different set of activities performed in each unit.

---

[10] *Task Analysis Inventories*, (Washington: U.S. Department of Labor, 1973; Series II & III, 1980).

Activities assigned on an emergency or temporary basis are not, for job analysis purposes, to be considered tasks of the job and do not constitute rotation, which must occur regularly. Also, disregard tasks that the worker is capable of performing, but which are not assigned as part of the job.

Figures 1 through 4 illustrate the three considerations for identifying jobs.

FIGURE 1
Similarity of Tasks

Worker A
Tends drill press that drills holes in wood furniture parts.

Worker B
Tends drill press that drills holes in metal furniture parts.

Worker C
Tends drill press that drills holes in wood container parts.

Worker D
Operates drill press to drill holes in metal furniture parts.

Worker E
Operates drill press to drill holes in metal container parts.

The summaries of the five positions shown above indicate that all are involved in tending or operating drill presses to drill holes in wood or metal. Since Workers A, B, and C tend drill presses, and Workers D and E operate drill presses, it appears that at least two jobs exist, based on differences in worker functions (tending and operating-controlling). While the work field (boring) and the machine (drill press) are the same for all five workers, the materials worked on differ (metal and wood) as do the products (furniture parts and container parts). Therefore, it is possible that Worker B performs a job that is different from Workers A and C, if drilling metal requires skills and knowledges that differ significantly from those required to drill wood. It is also possible that all five workers perform different jobs, if it can be shown that various combinations of materials and products require different work procedures, sizes and types of drill presses, and standards for precision attained.

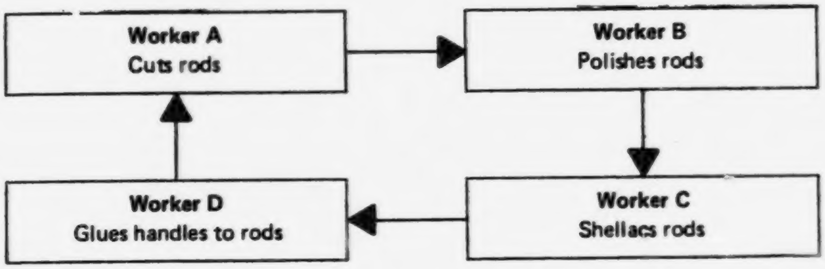
Figure 2 shows four hypothetical clerical positions having the same three tasks. The frequency with which a task is performed is usually an indication of its relative importance to the job. Workers A, B, C, and D would be considered as performing separate jobs. Workers A, B, and C each perform a different major or significant task, while Worker D performs all three tasks about equally. The jobs are essentially those of typist, file clerk, receptionist, and general clerk.

FIGURE 2
Relative Frequency (Time Percentage) of Similar Tasks

Tasks	Worker A	Worker B	Worker C	Worker D
1. Types reports, forms, and correspondence.	80%	5%	5%	35%
2. Files records and documents.	10%	85%	5%	35%
3. Receives visitors, schedules appointments, and directs visitors to appropriate destination.	10%	10%	90%	30%

Figure 3 shows four workers regularly rotating from one work assignment to another among four different tasks. As previously stated, when rotation occurs a single job usually exists consisting of the collective tasks of all work assignments.

FIGURE 3
Rotation of All Workers



An establishment may find that it is best to rotate some workers while allowing others to specialize in single work assignments, according to the preferences and skills of the individual workers. This situation is illustrated in Figure 4, which shows five separate assignments that result in five different jobs.

FIGURE 4
Rotation of Some But Not All Workers

Job A

20 Workers (rotate)

Cuts rods with saw

Polishes rods

Shellacs rods

Glues handles to rods

Job B
10 Workers (do not rotate)
Cuts rods with saw

Job C
12 Workers (do not rotate)
Polishes rods

Job D
14 Workers (do not rotate)
Shellacs rods

Job E
9 Workers (do not rotate)
Glues handles to rods

Meeting with Establishment Official at the End of the Study

After collecting the job-study data, meet again with the establishment contact official to report on the progress of the study, including an account of all jobs studied and an estimate of the number of jobs analysis reports to be prepared. Make arrangements to contact officials, such as department heads and supervisors, if questions arise during the preparation of the job analysis reports. Inform the official that completed reports will be mailed to the establishment for final review.

CHAPTER 3

WRITING JOB DESCRIPTIONS

Page

Parts of a Job Description 37

Recommended Style Conventions for Effective Job Descriptions 40

Determining Detail Needed in Job and Task Descriptions 40

Breaking a Job Down into Tasks 43

Flag Statements 50

Estimating Time Percentages of Tasks 51

Preparing Job Summaries 53

CHAPTER 3

WRITING JOB DESCRIPTIONS

A job description is an organized presentation of the facts about a job that distinguishes it from other jobs, including its purposes, tasks, responsibilities, and worker characteristics. This chapter prescribes methods to ensure that descriptions are clear and accurate.

Job descriptions are the products of job analysis studies and result from the collection and organization of job data in accordance with a particular job analysis methodology. A job description based on the U.S. Employment Service method may differ to some degree in detail, content, and style from other types of job descriptions. Since the purposes of job analyses vary, no single format is recommended; an analyst can select one or combine features of more than one, according to the needs of the user. The following discussion is applicable to all job descriptions, regardless of their particular form or purpose.

Parts of a Job Description

Most job description formats contain four major sections: the *job identification*, the *job summary*, the *body*, and the *job requirements*.

The *job identification* is the first section of the job description. It includes the establishment job title or titles and other identifying information, such as the job code (the establishment job number or the code from the *Dictionary of Occupational Titles*), salary-grade level, job location (e.g., department or section), and the number of positions covered by the job description.

The *job summary* section consists of a sentence that orients the reader to the job, giving an overall concept of its nature, complexity, and purpose. How to write the job summary is discussed on pp. 53-58.

The *body* (sometimes titled "work performed," "job duties," "task statements," or "task descriptions") is the main part of the job description and lists, in logical order, the tasks that make up the job. The amount of detail under each task ranges from a single sentence to an element-by-element analysis, depending on the intended use of the job description. Usually, each task statement is numbered and includes an estimate of the percentage of time devoted to that task. Detailed task descriptions are preceded by flag statements summarizing the task elements that follow (see p. 50). In some job descriptions, related duties are grouped under major duties. The scope, organization, and preparation of task descriptions are discussed later in this chapter.

Job requirements (sometimes titled "performance requirements," "job specifications," "worker requirements," "worker characteristics," or "worker traits") describes each trait, knowledge, ability, and adaptability needed by the worker for successful job performance. Included are education; training; experience; interests; temperaments; aptitudes; physical demands; environmental conditions; responsibility for work devices, materials, and quality of work; job knowledge; mental application; dexterity and accuracy; judgment and decisions; creativity; initiative; supervisory responsibility; contacts with others; and consequence of errors. This information relates to and supplements the identifying and work-performed information about the job, covered in the other three parts of the job description. It also serves to round out the total picture of the job by indicating the level of difficulty of its work activities from several different aspects.

The types and organization of job-requirement information to be included depend, again, on the uses of the job description. Perhaps the most common and important use, by industry, of the job-requirement data in job descriptions is for job evaluation (the pricing of jobs). The accepted methods of job evaluation in use today require comprehensive information on several fairly standardized job-requirement factors. On the other hand, the job-requirement factors used by the U.S. Employment Service are primarily for occupational classification and the publication of career and industry brochures and guidebooks, and are somewhat different from those used in job evaluation. The three categories of typical job requirements found in job descriptions are listed below with detailed breakdowns shown in Figure 1.

- *General:* A listing of job requirements representative of those found, in various combinations, in a variety of job descriptions.

- *Standardized Job-Evaluation Factors:* The four major job-requirement factors (and the subfactors of each) used by industry in most job-evaluation programs.

- *Employment Service Worker-Trait and Other Job-Requirements Factors:* The job-requirements items used by the U.S. Employment Service to reflect the worker characteristics and other requirements on the Job Analysis Report.

FIGURE 1

JOB-REQUIREMENT ITEMS IN JOB DESCRIPTIONS

General	Standardized Job-Evaluation[1] Factors	U.S. Employment Service Worker Trait and other Job-Requirement Factors
Abilities Accountability Accuracy Adaptability Confidential Data Consequence of Errors Contacts with Others Cooperation with Others Creativity Decision Making Dexterity Education Environmental Conditions Experience Independent Judgment Initiative Job Knowledge Judgments Mental Alertness Mental Application Mental Effort Mental Requirements Minimum Learning Period Minimum Qualifications Physical Requirements Problem Solving Reporting Relationships Responsibilities Responsibility for Quality of Work Skill Requirements Skills Specialized Know-how Supervision Given Supervision Received Training Visual Effort Working Conditions	Skill: Education Experience Initiative & Ingenuity Effort: Physical Demands Mental or Visual Demands Responsibility: For Equipment For Material For Safety of Others For Work of Others Job Conditions: Working Conditions Unavoidable Hazards	GED Aptitudes Temperaments Interests Physical Demands Environmental Conditions Years of Schooling Job Training Time and Specific Vocational Preparation: (a) High School Courses (b) Vocational Courses (c) College Courses (d) Apprenticeship (e) Inplant Training (f) On-the-Job Training (g) Performance on Related Jobs (h) Other Training or Experience Licenses, Own Tools, Etc. Relation to other Jobs: (a) Promotion Ladders (b) Supervision Received (c) Supervision Given

Examples of the four parts of a job description appear in Appendix C, pp. 421-424.

---

[1] *Job Evaluation: A Brief Guide* (Washington: Federal Mediation and Conciliation Service, 1965).

Recommended Style Conventions for Effective Job Descriptions

The following style conventions for job-description writing, commonly followed in industry, generally apply to the preparation of clear, effective job descriptions:

1. Use terse and direct style; omit all unnecessary words.
2. Use the present tense throughout.
3. "The worker," the subject of each sentence, is implied (unstated); do not use pronouns in place of "the worker."
4. Begin each sentence with an action verb, as specific as possible, to indicate what the worker does. (Exceptions to this convention are certain adverbs, such as "occasionally" and "manually," which may precede an action verb at the beginning of a sentence.)
5. Choose words that are exact and have only one interpretation.
6. Omit articles "the," "a," "an."
7. Do not use superlatives ("most," "best"), certain types of adverbs ("very," "perfectly"), and attributes ("complex," "large," "heavy," "small").
8. Avoid jargon, verbose phrasing, and little-known words; use simple, better known synonyms.
9. Set off technical and little-known terms and special or unusual machines, equipment, tools, work aids, materials, and products with parentheses or underlining the first time they appear; then define them in a supplemental section. The background of the intended users of a job description determines which terms need defining.
10. Number tasks sequentially and indicate the percentage of time spent at the end of each task description.
11. In detailed job descriptions, use flag statements to introduce and summarize each task. (They may not be needed for brief job descriptions.)

Determining Detail Needed in Job and Task Descriptions

Considerations

Job descriptions vary in detail from brief, generally worded task statements to element-by-element task descriptions that approach but fall short of the specificity of a motion study. Insufficient detail leaves the user with broad statements too vague to be useful. Excessive detail forces the user to sift through superfluous facts for pertinent data. Not everything in an analyst's notes needs to go into the job description. By eliminating, summarizing, or selectively highlighting data, the job descriptions can be more usable. Considerations in deciding how much detail to include are:

- *Purpose of the job description.* The purpose for which a job description is prepared is the major consideration in determining the detail needed. Those to be used for job classification, union negotiations, and the development of personnel policy, for example, need not be as detailed as those for aptitude-test development, job restructuring, and curriculum development.

- *Type of job studied.* Descriptions of factory, clerical, service, technical, and craft jobs are usually written in terms of specific actions performed. Professional and managerial jobs, frequently described more in terms of responsibilities than specific actions, generally require less detail.

- *Relative time percentages of tasks.* A task that is performed a significant percentage of the worker's time is usually written in more detail than it would be if it were performed infrequently. For example, an occasional machine-feeding task (performed 5 percent of the time) may be described as follows:

  > Feeds machines: Feeds stacks of paper blanks into feed racks of automatic cup-forming machines to maintain supply of blanks in each machine of battery.

  The same task performed 80 percent of the time would require more descriptive detail, such as shown below:

  > Feeds machines: Grasps 4- to 6-inch stack of paper cup-body blanks from bin and carries to feed rack of cup-forming machine. Examines blanks for curvature and defects, such as short size, missing print or ink color, cracks, creases, wrinkles, and dirt. Bends curved blanks in opposite direction to straighten, if necessary, to prevent jamming in machine. Holds stack of blanks in one hand and fans edges with other hand to separate stuck edges and to dislodge loose paper scrap. Removes and discards defective blanks and notifies supervisor if large quantity of blanks is affected. Places stack onto machine feed rack behind previously fed blanks and brushes line of liquid emulsion along top and bottom edges of stack, using paintbrush and container of emulsion located next to feed rack, to soften top and bottom edges of cup bodies to facilitate formation of rims and bottoms and to prevent paper from cracking. Walks from machine to machine periodically and repeats feeding procedure to maintain sufficient supply of blanks in feed racks of five machines.

- *Relative importance or skill level of tasks.* Important job tasks often require more detail than less important tasks, even when they take but a small percentage of the time. A worker may spend 80 percent of the time watching a machine for warning lights and automatic stoppage caused by problems with machine or raw material, but only 10 percent on adjusting the machine settings to prepare for operation and 10 percent on diagnosing malfunctions and taking proper corrective action. The latter two tasks, because they involve a higher degree of skill and are more important to successful performance, require more detail than the first task.

Another example is that of two workers performing the same activity: duplicating printed material on a photocopy machine. For one worker, a Duplicating Machine Operator who spends virtually 100 percent of the time on the activity, a detailed task description would be warranted; for the other worker, a General Office Clerk who only occasionally performs the activity, less detail would suffice.

- *Type of work activity.* Some work activities are commonplace and need not be described in specific detail to convey a clear picture of what is being done. In such tasks as "Sweeps sawdust from floor, using broom and dustpan" and "Hammers nails to seal lid on crate, using hammer," the actions involved are obvious. However, a specialized task, such as, "Measures thrust-load capacity of ball bearings, using mechanical preload gage" gives no clear depiction of how the worker does this; more detail is needed to enable the reader to understand the specific skills and actions involved, such as, "Manually places ball bearing into fixture of preload gage. Lifts and releases handle of gage to allow attached weight to fall onto bearing. Reads dial indicator on gage to determine if bearing's capacity to withstand impact is within prescribed tolerance range. Places acceptable and rejected bearings into separate trays."

Examples of Excessive Detail in Work-Activity Descriptions

Once it is decided that a detailed job or task description is needed, care must be taken to avoid creating a motion study description. For example, an element in a description of a Small-Parts Inspector might read: "Feels edges of machined metal part to detect burrs." It would be giving an excessive amount of detail to state: "Raises right hand 1 foot to table height, superimposes hand over metal part and, by depressing first and second fingers onto part and moving arm slowly sideways about 6 inches, feels with fingertips for snags and rough spots that are indicative of surface irregularities."

A job description is not a motion study; nor is it a training manual to teach a worker to perform the job through step-by-step work instructions. Excessive detail overwhelms the reader and obscures the features that distinguish that job from all others. The following example shows how one task of a Wire-Cloth Weaver can be written either as part of a job description or as a work procedure:

For Job Description: Installs specified arrangement of cams in loom for production of twilled-weave wire cloth, using handtools and following written instructions.

For Job Procedure: To produce twilled-weave in loom:

1. Install a #1 cam on the #1 treadle, centered above the cam follower.
2. Install a #2 cam on the #2 treadle, rotated 90° to the rear of the #1 cam.
3. Install a #3 cam on the #3 treadle, directly opposite the #1 cam.
4. Install a #4 cam on the #4 treadle, opposite the #2 cam and toward the front of the loom.

5. Repeat above cam-installation procedures on the other side of the heddle frames.

6. Connect #1 to #3 heddle frame by means of support chains.

7. Connect #2 to #4 heddle frame by means of support chains.

It is evident that most of the detail in the above work procedure is superfluous in a job description. Training manuals are available to evaluate job data, but the specificity of the final job description needs to be based on the five considerations just discussed. A detailed account of every step of the job or movement of the worker in a photographic or documentary fashion is not a useful job description.

Breaking a Job Down into Tasks

Identification and Organization of Tasks are Critical to Writing Effective Job Descriptions

Organizing job analysis data from notes and deciding on the number and scope of tasks to include in the job description is one of the most difficult aspects of job analysis. The primary consideration is to organize the job description so that the uninformed reader can gain a clear concept of the work performed.

From the definitions of *task* and *element* (Chapter 1, p. 6), it is shown that they differ in scope; yet an identical activity may be a task in one job, an element in another, or an entire job in itself. For example, the activity of typing addresses on envelopes could be an element of a task for a Secretary; an entire task for a Correspondence Clerk; and a complete job activity for an Envelope Addresser. For the Envelope Addresser, the activity can be further subdivided into tasks: (1) Prepares envelopes and address lists, and adjusts typewriter; (2) types addresses from lists onto envelopes; (3) counts, bundles, and packs addressed envelopes.

Considerations for Identifying Tasks

A job is a conceptual rather than a physical entity and, as such, cannot be neatly subdivided like a sliced pie or a stack of cards. Two analysts, studying the same job, are likely to write job descriptions with different task breakdowns, neither description being any more "correct" than the other, provided both are clear, complete, and accurate.

Except for the simplest of jobs, identification of tasks is based on a multifactor approach, using the following questions as guidelines:

- *Can the activity potentially be assigned to another worker?* If an activity is sufficiently divisible from other activities of the job so that it can be done by another worker, it may be considered as a separate task. If, on the other hand, it is not practical to assign the activity to another worker, it should be treated as an element, integrally related to other elements of a task by common purpose, sequence of actions, or decision-making factors.

In the example below, some activities of a Physical Therapy Aide, working in a hospital, are arranged in their usual order of performance:

1. Assists or lifts patients to transfer between wheelchair and treatment equipment, following instructions of Physical Therapist.
2. Observes patient during transfer for correct application of learned transfer technique and gives direction and encouragement as needed.
3. Informs therapist of adverse patient reaction during transfer.
4. Obtains and positions equipment for treatment.
5. Supports, guides, and stabilizes patients, as directed, while therapist administers treatments.

Activities 1, 2, and 3, all relating to the transfer of patients, are inseparable between the performer of activity "1" must also make concurrent observations "2" and take immediate action (notifying therapist) "3". Therefore, 1, 2, and 3 constitute a task. Activities 4 and 5, however, could each be written as a separate task because they are distinct activities assignable to other workers.

- *Do certain key job analysis components (GED, JTT and SVP, worker functions, work fields, work devices, and MPSMS) of the activity differ significantly from those of other activities included in the job?* This is determined by informally rating the various job activities and considering those with similar ratings for possible treatment as distinct tasks. Differences in GED, worker functions, and work fields usually justify treatment as separate tasks; differences in JTT and SVP, MPSMS, and work devices may justify such treatment, depending on other considerations. For example, because of different worker functions, the copying of data is almost always treated as a task distinct from the analysis of data; and, because of different work fields, the polishing of metal parts is a task separate from the assembly of those parts. However, the cutting of plastic sheets, using Handtool A and Machine B, may or may not be a task distinct from the cutting of metal sheets, using Handtool X and Machine Y, depending on the extent to which the required JTT and SVP, skills, knowledges, and abilities differ. A 3-month difference in JTT and SVP would, of course, be more significant when comparing activities with 1-and 4-month training times than when comparing those with 9- and 12-month training times.
- *Is the activity performed frequently enough to include as a distinct task?* A noncritical activity performed a small percentage of time (i.e., less than 5 percent) can be consolidated as an element of a broader task, included with other infrequent activities of a "miscellaneous" task, or deleted entirely as unimportant to the job.

- *Is the activity sanctioned by the establishment and performed by an accepted method?* As indicated in Chapter 1, p. 7, activities that are not recognized by management as part of the job are not included in a job description. Tasks performed in a nonstandard or unacceptable manner are described as they are expected to be performed.

- *Is the activity sufficiently broad in scope to be ratable for key job analysis components?* For example, "Turns control to regulate flow of material into machine" alone could not be meaningfully rated for GED and worker functions, but would have to be combined with other elements to collectively form a ratable task. Although only the entire job will eventually be rated, each task should have the potential to exist as a distinct activity, separately ratable and potentially assignable to another worker.

- *Is the activity self-contained to the extent that it does not include elements that overlap or duplicate other tasks?* For example, see the following element description and task summaries of the same job:

Element: "Wipes machine dies after clearing jammed metal, using rags and solvent, to clean die surface of metal dust and fragments."

Task A (summary): "Monitors machines and clears jams."

Task B (summary): "Cleans machines and work area."

If the analyst feels that cleaning of the die is an integral element of clearing jams, it should be included in Task A, but not in Task B. If it were included in both, an overlap would occur.

Below is an example of an element that duplicates a task of the same job:

Task X: Inspects raw material: Visually inspects raw materials for surface defects, such as scratches, creases, and coating imperfections; sets aside defective batches, and notifies supervisor of defects.

Task Y: Conveys raw material to jobsite: Reviews production order to determine types and amounts of raw materials needed for job order. *Examines raw materials for defects prior to conveyance to machine and notifies appropriate personnel of defective batches.* Conveys materials from storage area to machine area, using handtruck. Stacks materials in designated areas near machine. Periodically conveys additional materials to replenish supplies during production run.

Note that the italicized element of Task Y is repetitive of the entire Task X. The analyst must decide whether to retain Task X as a separate task or as an element of the broader Task Y, based on the integrity of the element with other activities performed prior, concurrently, or subsequent to the element.

Arranging Tasks for Job Descriptions

Once the tasks of the job are identified, the next step is to arrange them in a way that results in a clear, logical presentation.

- *Sequential or chronological presentation of tasks.* For jobs that have specific cycles or sequences of operations, list tasks in the order in which they are performed. The sequential arrangement generally applies to machine and factory-production jobs. For example, the tasks of a machine-operating job may be arranged as follows:

  1. Sets up machine.
  2. Operates machine.
  3. Removes workpiece.
  4. Inspects workpiece.
  5. Maintains tools.
  6. Maintains machine.

- *Functional presentation of tasks.* For jobs having no established sequence of operations, arrange tasks according to their function. Tasks, when broken out according to function, are arranged in one of the following ways:

  1. In descending order of the **percentage of time** spent in performing each task.

  2. In descending order of **importance** or criticality to the job as a whole.

  3. In descending order of **skill level,** difficulty, or responsibility.

  Decide which of the three arrangements presents the clearest picture of the job and is the most appropriate for the intended use of the job description.

  The amount of time spent by the worker in performing a task is sometimes the sole determinant of its relative importance to the overall job, especially if all tasks are at about the same skill level. For example, the tasks of the following jobs are properly presented in order of frequency:

  1. Packs oranges. (50%)
  2. Loads cartons of oranges. (35%)
  3. Assembles cartons. (15%)

  1. Plants, fertilizes, prunes, and waters flowers and shrubbery. (40%)
  2. Rakes and disposes of leaves. (30%)
  3. Shovels snow from walkways. (20%)
  4. Paints fences and outside structures. (10%)

  In most cases, however, functional tasks of a nonsequential job vary to some degree in skill level or importance. By presenting the most important or skilled tasks first in the job description, those which are vital to the job as a whole (regardless of the percentage of time spent in performing them) are highlighted so that the reader understands the job more quickly.

Important tasks are usually, but not always, the most highly skilled. The importance of a task is estimated by assessing the degree to which successful performance is necessary to meet the job's overall objective. The complexity of a task is determined by evaluating the skills, knowledges, abilities, judgments, and degree of responsibility required of the worker. To do this, the analyst informally rates each task for certain job analysis components, such as GED and worker functions, and compares the ratings to establish relative levels of complexity.

Grouping Similar Work Activities into Tasks

Activities similar in purpose or function are often separated by intervals of time, during which dissimilar activities are performed. For example, a Lunch-Counter Attendant serves several customers at once and shifts rapidly from one activity to another. An analyst, taking notes, might list the activities for serving each customer in the order observed:

1. Greets customer.
2. Provides customer with menu.
3. Positions napkin and glass of water on counter in front of customer.
4. Takes customer's order and fills out check by recording name and price of each item ordered.
5. Selects proper eating utensils according to items ordered and places on napkin.
6. Prepares beverages, such as coffee, tea, and soft drinks.
7. Prepares sandwiches, salads, and hamburgers.
8. Prepares ice-cream products, such as floats and sundaes.
9. Serves food, beverages, and ice-cream products to customer.
10. Takes orders for additional items, such as desserts.
11. Computes and records tax on check and totals check.
12. Collects payment from customer.
13. Operates cash register to record payment, deposits payment, and removes change.
14. Returns change to customer.
15. Clears away used dishes and utensils.
16. Wipes counter or booth with damp cloth.

One way to organize these activities into tasks is as follows:

(1 and 2)	Greets customer and provides menu. (A distinct activity, performed in some establishments by a host or hostess. Worker Functions: comparing, serving, and handling. Work Field: accommodating.)
(3 and 5)	Provides customer with napkin and water prior to taking order and with appropriate utensils after taking order. (Both activities are arranging the place setting; the fact that some items are placed before the order is taken and some afterwards does not justify separating the arranging of the place setting into two tasks. [The Worker Functions, comparing, serving, and handling; and the Work Field, accommodating, are similar to those of Task 1.] Tasks 1 and 2 could be combined into a single task if the time percentage of one or both is too low to justify separating them as shown here.)
(4 and 10)	Takes initial customer order and additional orders, such as order for dessert, and records name and menu price of each item on customer check. (Identical activities, although performed at different times. Worker Functions: compiling, serving, and handling. Work Field: numerical recording-recordkeeping.)
(6, 7, and 8)	Prepares food requiring short preparation time, such as sandwiches, salads, hamburgers, and ice-cream sundaes; and beverages, such as coffee, tea, and soft drinks. (Since the preparation of various types of food and beverages, although involving different techniques, procedures, and equipment, is similar enough in function and purpose to be assigned identical work performed ratings, all food-and-beverage-preparation activities can be combined into a single major task. Worker Functions: compiling, serving, and manipulating. Work Field: cooking - food preparing.)
(9)	Serves food and beverages to customer. (Retained as a distinct task; this activity can be performed by another worker. Worker Functions: comparing, serving, and handling. Work Field: accommodating.)
(11)	Totals prices on check, computes tax or determines tax from chart, records total amount, and hands check to customer. (Retained as a distinct task. Worker Functions: computing, serving, and handling. Work Field: numerical recording-recordkeeping.)
(12, 13, and 14)	Collects payment from customer, operates cash register to record sale, and returns change. (Integrally related activities that form a distinct task; not consolidated with previous Task 6 because many

establishments have separate workers performing these activities: e.g., Cashier and Waiter/Waitress. Worker Functions: computing, serving, and operating-controlling. Work Field: numerical recording-recordkeeping.)

(15 and 16) Clears away used dishes and utensils and wipes countertop or booth table with damp cloth. (Both activities are elements of an overall cleaning function and form one task. Worker Functions: comparing, taking instructions-helping, and handling. Work Field: cleaning.)

The above task descriptions, while based largely on functional considerations, are arrranged more or less sequentially to reflect the work cycle for serving an individual customer. This arrangement presents a clear picture of the job.

Grouping Sequential Work Activities into Tasks

In order to identify the tasks of sequential, short-cycle jobs, it is necessary to determine the points in the work cycle where activities or groups of activities can be separated into tasks. The example below shows the sequential elements of a Power-Press Tender and one way in which they can be grouped into tasks. The rationale for each task is stated, based on some of the considerations for task identification previously discussed.

1. Picks up metal ring from tray.
2. Picks up wood mop handle from carton.
3. Examines ring and mop handle for obvious surface irregularities and discards defective ones.
4. Inserts ring onto narrowed tip of mop handle.
5. Positions ringed end of mop handle onto jig of power press.
6. Depresses treadle to actuate power-press ram that crimps ring to handle and forms partial thread on ring.
7. Rotates mop handle one-half turn to positon ring for completion of thread.
8. Depresses second treadle to actuate power-press ram that forms remainder of thread on ring.
9. Removes mop handle from jig and places into cart.
10. Reads counter on press at end of workshift and records readings on production ticket.
11. Sweeps floor around press at end of workshift, using broom and dustpan.
12. Oils press once daily, using oilcan.

The above activities could be grouped as follows into a three-task job description:

Task 1: (Elements 1, 2, 3, and 4) Inserts metal ring onto end of mop handle. (Rationale: The fitting of the ring onto the end of each mop handle is an activity that prepares the product for a machine operation; it could be done by another worker as a nonmachine activity. The elements are integrally related and inseparable.)

Task 2: (Elements 5, 6, 7, 8, and 9) Tends power press to stamp threads on metal ring and to crimp metal ring onto end of mop handle. (Rationale: The elements beginning with the feeding of the mop-handle assembly into the machine and ending with the removal of the finished handle comprise the machine-related part of the job: tending the power press. The elements of this task are performed in rapid succession during which time the worker's hands never leave the product.)

Task 3: (Elements 10, 11, and 12) Performs miscellaneous activities. (Rationale: These infrequently performed activities are incidental to the main purpose of the job, fabricating mop handles, and are best consolidated into a "miscellaneous" task, thus placing the two more-important tasks in better perspective in the final job description.)

Flag Statements

A flag statement is a short summary of a task that precedes the written task description. It consists of a verb(s) and its object(s), and serves to orient the reader to the scope and content of the task about to be described, by stating in general terms what the worker does. The task description which follows elaborates on the flag statement through specific action verbs, as well as the other categories of job information.

In the following task of an Engine-Lathe Set-up Operator, the flag statement is "Sets up lathe."

> Sets up lathe: Examines blueprints to determine dimensions of part to be machined, using shop mathematics to calculate dimensions not given directly on prints or to calculate machine settings. Attaches to lathe such accessories as chuck and tool holder; threads and locks chuck on headstock spindle; and sets and tightens toolholder in tool carriage, using setscrew and wrench. Opens chuck jaws to approximate size of workpiece, inserts workpiece between jaws, and tightens jaws, using chuckwrench. Centers workpiece in chuck jaws, locating dial indicator against workpiece, rotating chuck and workpiece by hand, and making coincident minor adjustments to chuck jaws until wobble in workpiece disappears as shown by needle of indicator. Selects cutting tool shaped and sharpened for type of metal and cut and

> clamps tool at suitable cutting angle in holding dog of toolholder, judging angle of cut by eye. Selects correct lathe speed according to metal used and type of cut to be made, basing decision on experience or referring to handbook, and sets control levers to selected speed.

It is important that flag statements be sufficiently comprehensive to cover all basic activities of the task. A common error found in job descriptions is the use of flag statements that are too narrow in scope for the task described, such as in the following example:

> Fells trees: Pulls cord to start gasoline-powered chainsaw. Squeezes trigger to bring chainsaw up to cutting speed. Cuts notch in standing tree in direction of desired fall. Cuts halfway through tree in center of notch. Walks around tree and completes cut from other side (backcut), stepping back to avoid possible jump or twist from stump. Walks alongside felled tree and limbs tree (saws off all branches), squeezing and releasing chainsaw trigger to increase or decrease cutting speed depending on diameter of branch and resistance of wood. Holds chainsaw firmly against tree throughout cutting process to avoid kickback from knots and tough bark.

The flag statement, "Fells trees," covers the activities described in the first five sentences of the task description. The sixth sentence, beginning with "Walks alongside felled tree and limbs tree . . .," describes an activity that is performed after the tree is felled: namely, the limbing of trees. (The last sentence of the description pertains to both felling and limbing.) The flag statement should read, "Fells and limbs trees."

If it is difficult to develop a concise flag statement for a prospective task, it may indicate a need to break down the activities into two or more tasks.

Flag statements may be written in worker-function terms, such as "Compiles data," "Instructs students," and "Tends machine," or they may have other verbs, such as "Maintains files," "Prepares report," and "Responds to customer inquiries."

Task descriptions which are extremely brief or have little detail may not require flag statements. It is redundant to include a flag statement for tasks described as follows:

- Folds letters and stuffs them into envelopes.

- Hand-delivers messages to other departments of establishment.

- Formulates department policies and procedures.

Estimating Time Percentages of Tasks

It has been shown that the amount of time spent by workers in their activities is important in such aspects of job analysis as identifying jobs (Chapter 2, p. 30); identifying tasks (p. 13); and arranging tasks in the body of the job description (p. 16); the inclusion of a time-percentage estimate after each written task description is recommended on p. 40. The ways in which data is collected about the time spent on the various work activities studied has also been discussed (Chapter 2, p.28). It is therefore important to be able to estimate time percentages for each task as accurately as possible, with the realization that few jobs allow for these estimates to be done precisely.

Estimating and recording the time percentage of each task is one of the last steps in preparing the body of the job description. This involves making arithmetic calculations ranging from a simple conversion of units of time to percentages (e.g., 2 hours = 25% of 8 hours) to complicated computations.

Figure 2 shows some of the ways in which data on time consumption appears in an analyst's job-study notes, and how percentages are estimated from that data. In all cases, the workday will be considered to be 8 hours or 480 minutes.

FIGURE 2

Task A: The material is conveyed by handtruck 12 to 18 times per day; it takes about 5 minutes each time.

5 minutes x 15 (average number of occurrences) = 75 minutes (total time spent on task)

$$\frac{\text{75 minutes (total task time)}}{\text{480 minutes (total workday)}} \times 100 = 15.6\% \text{ or } 16\% \text{ (rounded off to the nearest percent)}$$

Task B: The report is prepared twice a month; it takes a full workday each time.

8 hrs. x 2 (number of occurrences) = 16 hrs. per month (total time spent on task)

$$\frac{\text{16 hours (total task time)}}{\text{160 hours (total working hours in month)}} \times 100 = 10\%$$

Task C: An average of 350 envelopes per day are labeled. It takes about 5 seconds to pick up, moisten, and press each label onto the envelope.

5 seconds x 350 (occurrences) = 1750 seconds = 29.2 minutes (total time spent on task)

$$\frac{\text{29.2 minutes}}{\text{480 minutes}} \times 100 = 6.08\% \text{ or } 6\%$$

Task D: Ten machines are lubricated twice daily. The 6 "A"-model machines take about 5 minutes to lubricate each time, and the 4 "B"-model machines take about 10 minutes to lubricate each time.

5 minutes x 6 machines x 2 (twice daily) = 60 minutes
10 minutes x 4 machines x 2 (twice daily) = 80 minutes
140 minutes (total time spent on task)

$$\frac{\text{140 minutes}}{\text{480 minutes}} \times 100 = 29.2\% \text{ or } 29\%$$

Task E: A total of 50 intermittent-compression treatments were administered during the last 12 months with irregular frequency so that the number of treatments in a given month ranged from two to ten. Each treatment takes about one hour.

1 hour x 50 = 1.25 weeks

$$\frac{\text{1.25 weeks}}{\text{50 weeks (one year)}} \times 100 = 2.5\% \text{ or } 3\%$$

When various positions of the same job differ in the percentage of time spent on each task, it is the *average* percentage of time that is shown after each task description. For example, Figure 3 compares the percentage of time spent on each of five tasks for four positions of the same job.

FIGURE 3

Task Number	Position A	Position B	Position C	Position D	Average % for Task
1	25%	40%	30%	25%	30%
2	25%	15%	20%	30%	23%
3	20%	25%	35%	30%	27%
4	20%	10%	15%	15%	15%
5	10%	10%	0%	0%	5%

Note that the percentage for each task, as shown in the last column, is that task's average percentage for all the positions, whether they contain the task or not. In obtaining a figure for the last column, the percentage on the same line, under each of the four positions, are added and the total divided by 4, the number of positions (e.g., Task #5: the average is computed on the basis of $10 + 10 + 0 + 0 = 20 \div 4 = 5\%$).

Preparing Job Summaries

The job summary should be prepared after the body of the job description is written. It should reflect the worker's relationship, if significant, to data, people, and things and the levels of worker functions, as well as the assigned work fields, and MPSMS. In some cases, work devices and the work setting, such as work locations and type of establishment, should also be reflected. Most jobs can be summarized in a concise, general way, such as: "Supervises and coordinates activities of workers engaged in assembly of typewriters."

Flag Statements of Tasks Summarized:

- Schedules production activities:
- Assigns work:
- Troubleshoots technical problems:
- Resolves worker grievances:
- Trains workers:
- Prepares production and personnel reports:

Other examples of this type of job summary are:

- "Administers intercollegiate athletic program activities for university."
- "Instructs students in machine-shop practices in vocational high school."
- "Conducts research into mathematical theories and proofs and develops statistical methodology."
- "Controls gamma-radiation equipment to irradiate materials for scientific research."

For a small percentage of jobs, it may be desirable to develop the job summary by consolidating the flag statements of the major tasks and adding information as necessary to substantiate the work performed ratings for the overall job. The following job summary for an Information-Desk Clerk illustrates the way in which the tasks (which follow) are summarized:

Job Summary:

Answers inquiries and gives directions to customers, authorizes cashing of customer's checks, records data on lost charge cards, sorts and alphabetizes new credit applications, and requisitions supplies, working at information desk in department store Credit Office.

Description of Tasks:

1. Answers inquiries and gives directions to customers: Greets customers at information desk and ascertains reason for visit to Credit Office. Directs customer to Credit Interviewer to open credit account, to Cashier to pay bills, to Adjustment Department for correction of billing errors, or to other store departments on request, referring to store directory. (35%)

2. Authorizes cashing of customers' checks for payment to credit account: Requests identification, such as driver's license or charge cards, from customers, and examines check to verify date, amount, signature, and endorsement. Initials checks to authorize cashing, and directs customer to Cashier. Refers customer presenting Stale Date Check (more than 30 days old) to bank. (20%)

3. Sorts and alphabetizes new credit applications daily: Separates regular charge-account applications from budget accounts. Sorts charge-account applications into local and out-of-town applications and arranges applications alphabetically within groups. Counts number of applications in each group and records totals into daily record book. Binds each group of applications with rubberband, and places in basket for routing to tabulating room. (15%)

4. Prepares requisitions for supplies: Copies amounts of supplies requested by Credit Department personnel onto requisition forms. Submits forms to Purchasing Officer or Supply Room. (10%)

5. Stores supplies: Places supplies on shelves in department store storeroom. (5%)

6. Answers telephone calls from customers reporting lost or stolen charge cards and arranges for cancellation of former card and replacement: Obtains details from customer on telephone regarding lost or stolen card, and requests letter of confirmation. Notifies Authorizer immediately, by telephone or in person, to prevent fraudulent use of missing card. Records identifying information on form to order replacement card for customer when confirming letter is received. (5%)

7. Keeps records of charge cards inadvertently left in sales departments: Places card and sheet of paper in imprinting device and pulls head of device to press imprint of card onto paper. Dates sheet and retains for own records. Records on form customer's name, address, and date card was returned and routes form and card to Authorizer. (5%)

8. Performs routine clerical tasks in the processing of mailed change-of-address requests: Fills out change-of-address form, based on customer's letter, and submits to Head Authorizer for processing. Files customer's letter. Contacts customer by telephone or mail to obtain delivery address if omitted from letter. (5%)

Note that the major tasks (comprising 85% of the time) are included in the job summary; the tasks performed infrequently (i.e., three of the four 5% tasks) are not included. The three categories of information, which support the work performed ratings for the job, are reflected or implied as follows:

Work Actions:	Answers inquiries, gives directions, authorizes, records, returns, sorts, alphabetizes, requisitions. Significant worker functions reflected: compiling, speaking-signaling.
Purposes:	To provide information to customers, to keep records of credit transactions. (Implicit in the worker actions.) Work fields reflected: information-giving (282), numerical recording-recordkeeping (232).
Services Provided:	Credit and information service and administration MPSMS reflected: clerical services except bookkeeping (891).

Style Formats of Job Summaries

For a job rated as machine or equipment significant (setting up, operating-controlling, driving-operating, tending, or feeding-offbearing) the steps in preparing a job summary, applying the sentence analysis technique, are as follows:

- Begin with the *worker action,* a verb determined by the things - worker function term. Remember that "the worker" is always the implied subject of the verb.

  Example: "*Tends* . . ."

- Follow with the machine or equipment used, as the immediate object of the action verb.

  "Tends *injection molding machine* . . ."

- Next, indicate the *purpose of the worker action* by an infinitive phrase, beginning with the word "to." The purpose, thus stated, should reflect the assigned work field.

  "Tends injection molding machine *to mold* . . ."

- Next, indicate the *materials* and/or *products,* as the object of the infinitive phrase. Materials and products must be appropriate to the MPSMS rating assigned.

  "Tends injection molding machine to mold *resin pellets* into *plastic bottles.*"

For a nonmachine, things-significant job (precision working, manipulating, or handling), begin the job summary with a verb that states the worker action in terms of the job's purpose; then, follow with the MPSMS. Next, include in some logical order, the basic work devices used (including, when appropriate, the types of work instructions followed). If a limited number of work devices is used, each type should be specified, such as, ". . . using tweezers, eye loupe, and hand soldering iron"; if a variety of work devices is used, only the general types should be indicated, such as, ". . . using a variety of metal-working machines, handtools, power tools, and precision measuring instruments." The summary of a Plumber job illustrates this style format:

> Assembles, installs, and repairs heating, water, and drainage systems, using variety of machines, welding equipment, power tools, and handtools and following blueprints, specifications, and plumbing codes.

"Assembles, installs, and repairs . . ." states both the worker actions and the job objectives, while "heating, water, and drainage systems" are the products (MPSMS). Because the job is also data significant, the data function (compiling) is substantiated by . . . using a variety of machines, welding equipment, power tools, and handtools and following blueprints, specifications, and building codes"; the work devices and types of instructions not only substantiate the data-function rating but also the things-function rating (precision working) which would otherwise not be evident by the action verbs alone.

For a job that is essentially data significant, begin the job summary with the worker action verb that matches or is synonymous with the data worker function, and follow with the object of the verb, which must reflect information of some kind. For example:

> *Evaluates credit information* to investigate
> credit ratings of bank customers.

"Evaluates" places the job at the analyzing level. Unless the job is also people and/or things significant, only the data involvement need be included in the job summary, as in the above example.

For a job that is people significant, begin the job summary with the worker action verb that matches or is synonymous with the people worker function, and state the object of the verb, which is usually the people who are dealt with or served. In the example below, the worker action, "instructs," denotes the job objective (to teach), which need not be separately stated; the object of the verb is "students."

> *Instructs students* in social studies and English.

In the case of sales jobs, the object of "sells" is the commodity or service sold rather than the customers.

> *Sells shoes* in men's shoe store.

Additional information can be included in the job summary, using discretion, to indicate the work setting, such as work location and type of establishment. This information may or may not be important for a complete understanding of the job's objective or MPSMS. The previous examples are expanded as follows to show how the work setting can be incorporated into a job summary:

- Tends injection molding machine to mold resin pellets into plastic bottles, *working in container department of pharmaceutical-manufacturing firm.*
- Assembles, installs, and repairs heating, water, and drainage systems, using a variety of machines, welding equipment, power tools, and handtools, and following blueprints, specifications, and plumbing codes, *working for plumbing contractor specializing in new construction.*
- Evaluates credit information to investigate credit ratings of bank customers, *working for credit-reporting establishment.*
- Instructs students in social studies and English, in *private, parochial junior high school.*

The style formats presented in this section of the chapter apply to job summaries but not necessarily to the writing of task statements or elements in the body of the job description. An analyst is not expected to force the sentence structure of task descriptions into a rigid format; this would frequently result in awkward and wordy sentences. Except that all sentences in a job description should start with action verbs followed by their objects, the only requirement is that the task descriptions be clear and logical, observe the rules of correct English and the conventions outlined on p. 40, and include all categories of information necessary for understanding the activity.

CHAPTER 4

ORGANIZATION CHARTS

Page

Components of an Organization Chart 61

Characteristics and Limitations of Organization Charts 62

Recommended Types of Organization Charts 62

Considerations in Chart Layout 64

Special Charting Situations 70

Mechanics of Charting 71

CHAPTER 4

ORGANIZATION CHARTS

An organization chart is a schematic portrayal of the organizational structure and the formal reporting relationships among jobs within an establishment. Such charts depict the skeleton of an establishment's organization and provide at a glance a basic understanding of how the establishment functions through departmentalization and worker specialization. For management personnel, an organization chart has value as a tool in organization analysis and personnel administration. For an analyst conducting a study of jobs at an establishment, an organization chart provides, enhances, or verifies an understanding of the existing organization and serves as an important reference supplement to the job analyses.

Components of an Organization Chart

Boxes represent the units of the organization. They depict jobs, positions, or groups of workers in one or more job titles; divisions, departments, sections, or other organizational units; or broad functions of workers or organizational units.

Lines indicate channels of authority, accountability, or cooperation. They are straight and should be charted vertically or horizontally.

- *Solid lines* are used to indicate *line authority* (the authority to direct operations and/or supervise workers; to give orders and enforce compliance). Solid lines link units in a given chain of command and indicate functional authority as well as line authority unless dual reporting relationships are shown.
- *Dashed lines* are used to indicate *functional authority* only (the authority to advise, assist, support, and/or inform management or operating staff — but not to direct and supervise).
- *Dotted lines* are used to indicate *cooperation* and should be charted only when cooperation between units is pronounced.

Captions appear within boxes for identification of job titles, divisions, departments, sections, numbers of workers, and/or functions of a job or organizational subdivision.

Headings, titles of charts, usually consist of the name or identification number of the establishment and/or the name of the division or department covered by the chart.

Dates, appearing at the top or bottom of charts, indicate the time at wnich the organization, as depicted, existed.

Characteristics and Limitations of Organization Charts

Simplicity and Clarity. The organization chart should be easy to follow and understand. It should show formal reporting relationships only. Do not attempt to show informal relationships nor convey other types of information by using footnotes, symbols, or elaborate devices; this will only cause clutter or confusion. Do not overuse dotted lines to denote cooperation; this will also reduce the clarity of an organization chart.

Balance. Arrange the chart so that the alinement and spacing of boxes and lines are reasonably balanced and uncrowded. To accomplish this, charting techniques (to be discussed later) must often be imaginatively applied. While few organizations can be charted in a perfectly symmetrical way, most charts can be laid out in an eye-appealing manner.

Recency. The chart should portray the organization as of the date of the study and not show projected jobs or organizational changes not yet implemented.

Consistency. Unit and job titles and lines of authority on the chart should reflect official company titles and be consistent with those used or indicated in other job analysis items prepared, such as job analysis reports, staffing tables, and narrative reports. The content of chart captions should be consistent; for example, if the analyst decides to include the number of positions after each job title, all boxes must contain that information.

Purpose. The chart should show organizational structure and reporting relationships only. Do not attempt to show status, importance, or responsibility of jobs or subdivisions by the relative size of the boxes or by any other means.

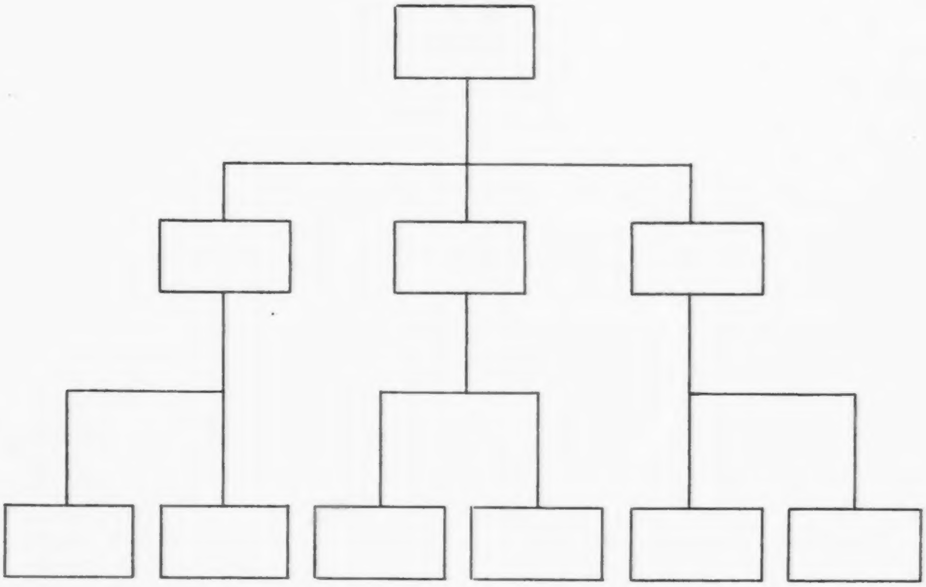
Size. The chart should fit on standard 8½ x 11-inch paper without being overcrowded. Avoid long, foldout charts by revising the layout, breaking it down into more than one chart, or reducing its size by photocopy.

Recommended Types of Organization Charts

The following types of organization charts are those most commonly used in industry. The size and complexity of the organization to be charted is frequently the determining factor in selecting the type of chart to use.

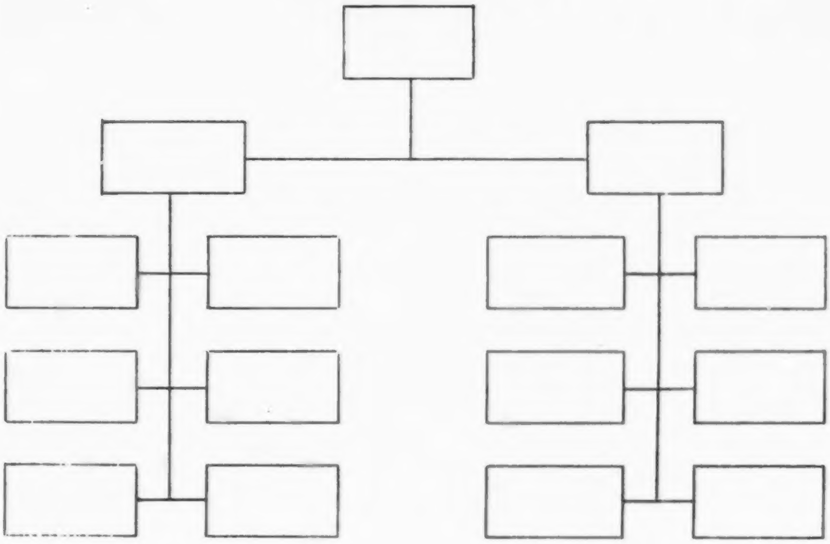
Scalar Vertical Chart. This variation of the vertical organization chart, also known as a pyramidal chart, shows the different levels of an organization in a schematic scalar (step-like) fashion, arranged from the top to the bottom of a page. The scalar chart consists of lines, boxes, and captions, and is easy to read. The connecting lines graphically illustrate both the downward flow of formal authority and the upward direction of accountability among the chart elements. The scalar chart is especially effective in showing the pyramidal structure typical in many business organizations and clearly defines levels of authority, chains of command, and spans of control. It can also depict line and staff positions, jobs, and functions. While scalar charts are clear and graphic, they require more space on a page than most other types of charts.

FIGURE 1
Scalar Vertical Chart



Nonscalar Vertical Chart. When the size and complexity of an organization preclude use of the scalar-chart format, space-saving charting techniques can be employed which produce the nonscalar variation of the vertical organization chart. Levels of management become less obvious visually by the format of the box arrangement, and clarity depends more on the network of connecting lines. If properly formated, this type of chart can be quite effective.

FIGURE 2
Nonscalar Vertical Chart



Considerations in Chart Layout

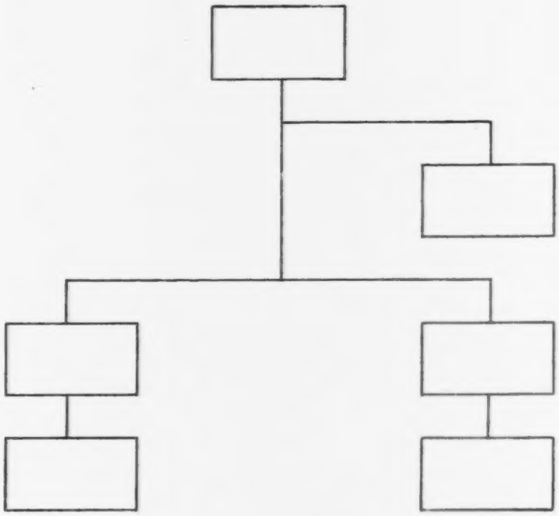
A well laid-out organization chart is balanced and easy to read as the result of proper use of lines and the size, spacing, and alinement of its boxes. The following considerations should be taken into account when evaluating the effectiveness of existing charts or planning new charts.

Lines

There are two basic types of lining commonly used for organization charts and often combined; they are vertical lining and sidearm lining.

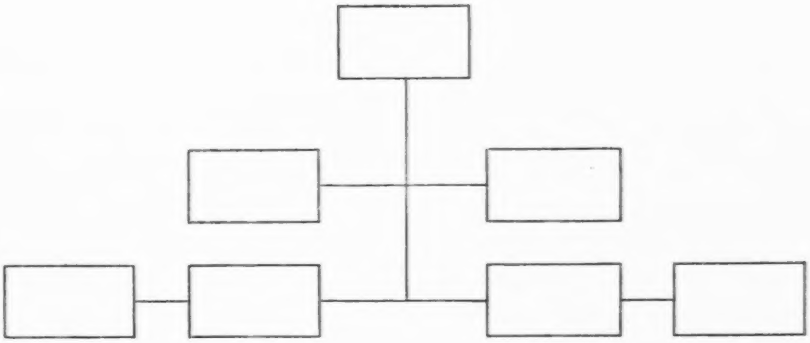
Vertical lining is characterized by connecting lines that enter and leave the boxes vertically (see Figure 3). Use of this type of lining is preferable when there is no need to conserve chart space, especially in scalar charts.

FIGURE 3
Vertical Lining



Sidearm lining consists of connecting lines that enter and leave the boxes horizontally from the left or the right (see Figure 4). This is effective as a space-saving technique, especially in parts of the chart where several subordinates report to one supervisor. However, sidearm lining is not as graphic as vertical lining in showing flow of authority and accountability.

FIGURE 4
Sidearm Lining



Avoid Overcrowding Charts

An organization chart should not attempt to show too much on a single page. An overcrowded chart makes it difficult to visualize the organizational structure at a glance. As a general rule, a chart should have no more than eight boxes in any horizontal row and a total of no more than 50 boxes on a single page.

The analyst may be able to reflect all of the establishment's organizational units and component jobs on a single chart, if the company is not too large and complex and, if the number of necessary boxes can be arranged on one page in an uncrowded manner. However, it is often desirable or necessary, especially for larger etablishments, to produce a chart for the entire organization (showing relationships between subdivisions) and, in addition, one or more detail charts of its subunits.

- *Overall Chart (General, Master, or Covering Chart):* A broad organization chart which shows the overall breakdown of the establishment's functional units, such as divisions, departments, and sections, without detailing specific jobs within these units.

- *Detail Chart (Subunit, Subsidiary, or Auxiliary Chart):* Portrays the job structure of one or more of the units shown in the overall chart.

Figure 5 shows an example of an overall organization chart, depicting the headquarters of a large metropolitan animal humane society to the division level. Figures 6 and 7 are detail charts for two of its five divisions: the dog license center and the animal hospital. It is obvious that the entire organization could not have been shown on a single, easily readable chart.

FIGURE 5
Overall Chart, Animal Humane Society
October, 1972

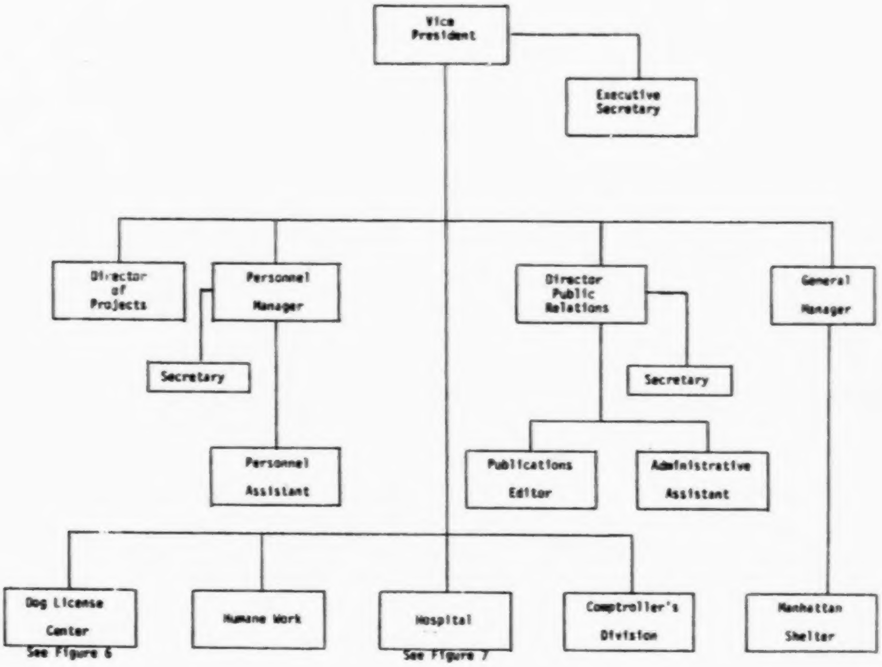

Vice President
Executive Secretary
Director of Projects
Personnel Manager
Secretary
Personnel Assistant
Director Public Relations
Secretary
Publications Editor
Administrative Assistant
General Manager
Dog License Center
See Figure 6
Humane Work
Hospital
See Figure 7
Comptroller's Division
Manhattan Shelter

FIGURE 6
Detail Chart, Dog License Center of Animal Humane Society
October, 1972

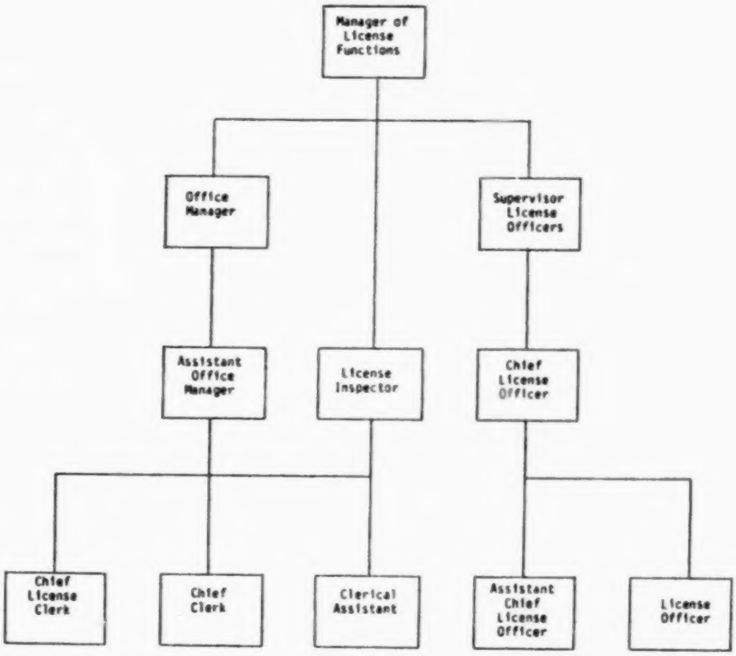
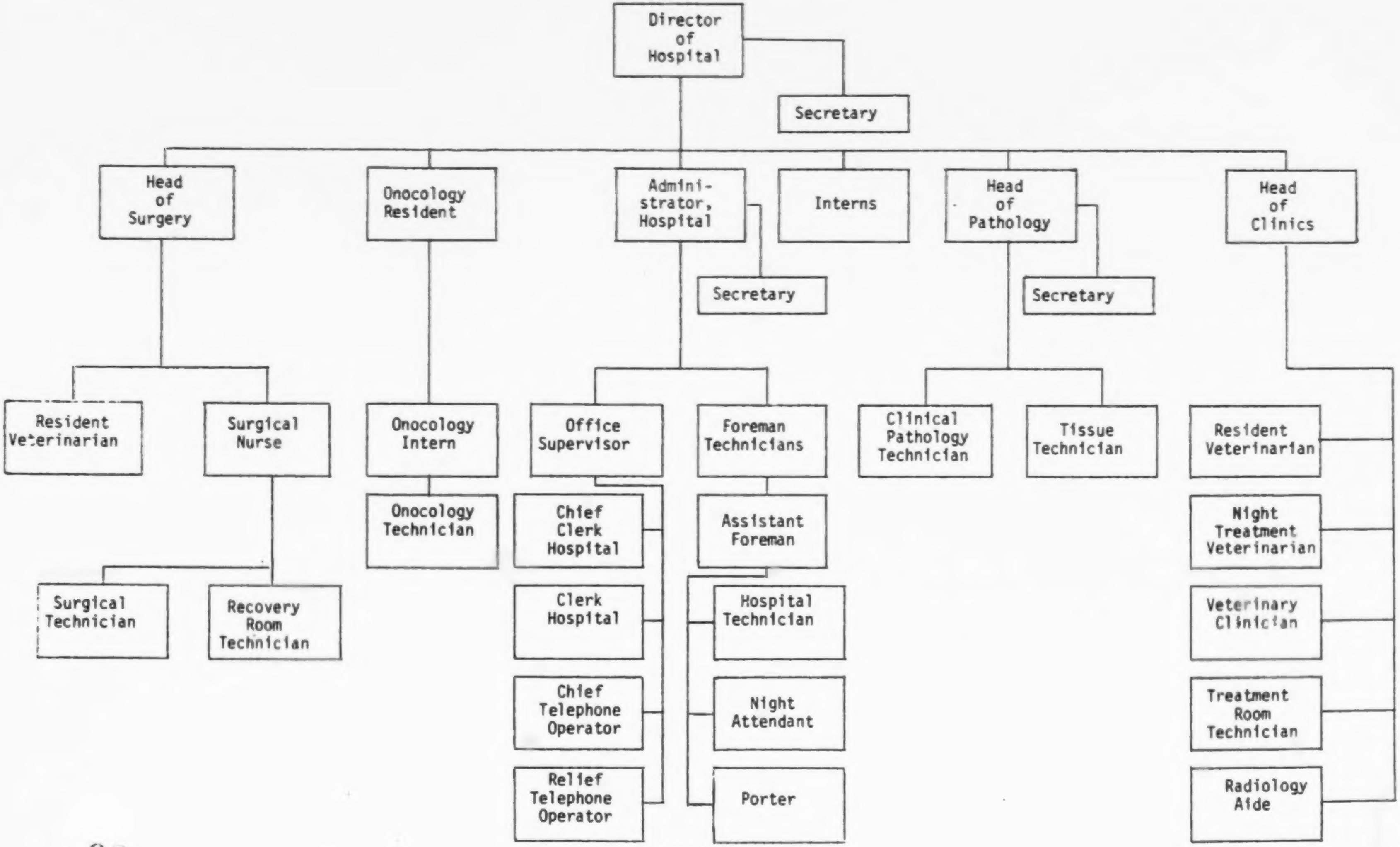

Manager of License Functions
Office Manager
Supervisor License Officers
Assistant Office Manager
License Inspector
Chief License Officer
Chief License Clerk
Chief Clerk
Clerical Assistant
Assistant Chief License Officer
License Officer

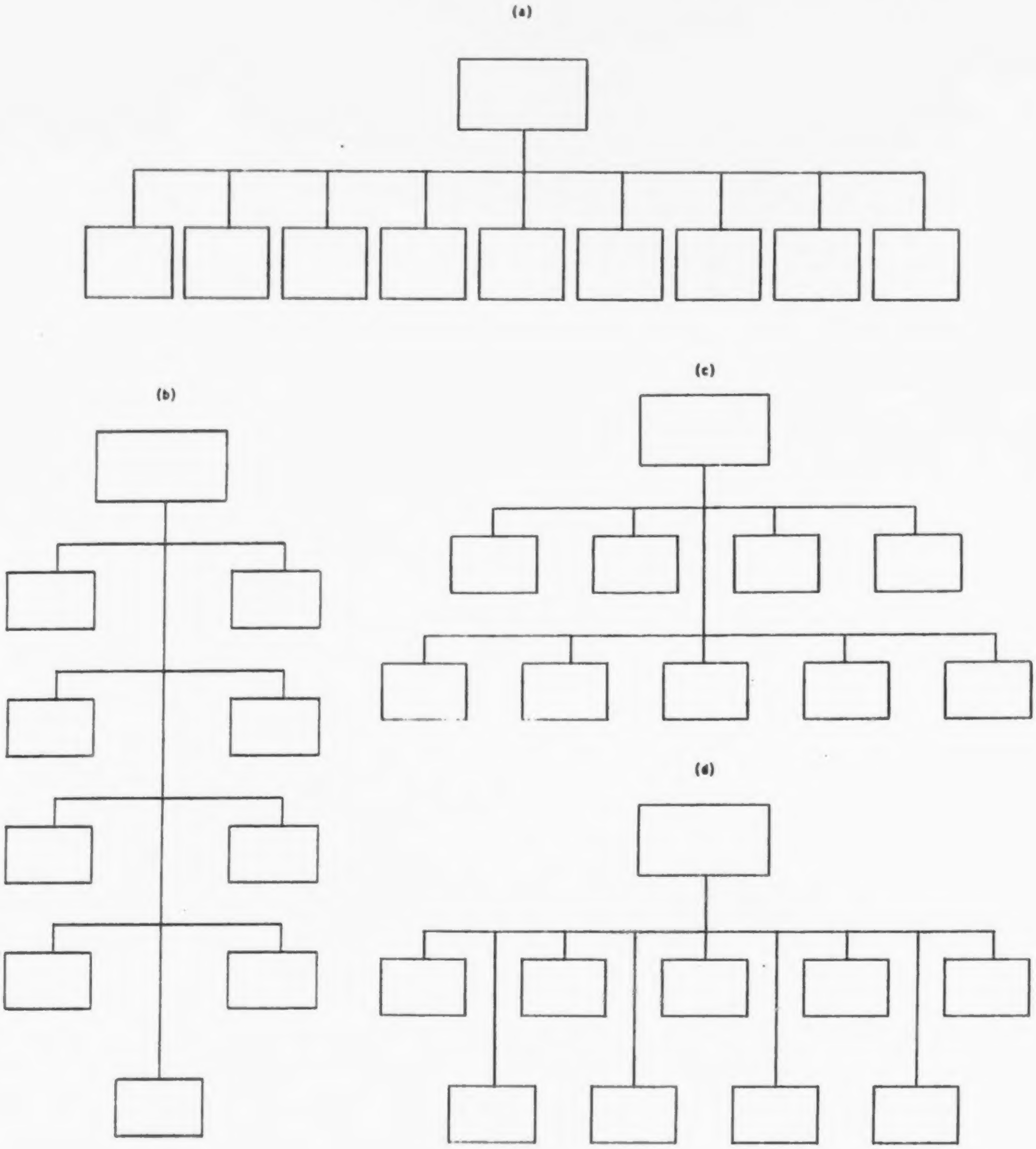
FIGURE 7
Detail Chart, Hospital of Animal Humane Society
October, 1972


Director of Hospital
Secretary
Head of Surgery
Onocology Resident
Admini-strator, Hospital
Interns
Head of Pathology
Head of Clinics
Secretary
Secretary
Resident Veterinarian
Surgical Nurse
Onocology Intern
Office Supervisor
Foreman Technicians
Clinical Pathology Technician
Tissue Technician
Resident Veterinarian
Onocology Technician
Chief Clerk Hospital
Assistant Foreman
Night Treatment Veterinarian
Surgical Technician
Recovery Room Technician
Clerk Hospital
Hospital Technician
Veterinary Clinician
Chief Telephone Operator
Night Attendant
Treatment Room Technician
Relief Telephone Operator
Porter
Radiology Aide

Space Conservation Through Chart Realinement

Space on a chart can very often be conserved by realining boxes, as shown in Figure 8. When vertically realining boxes, remember that the level of boxes on a chart is not necessarily an indicator of hierarchical importance.

FIGURE 8
Four Ways of Charting Nine Workers Reporting to One Supervisor



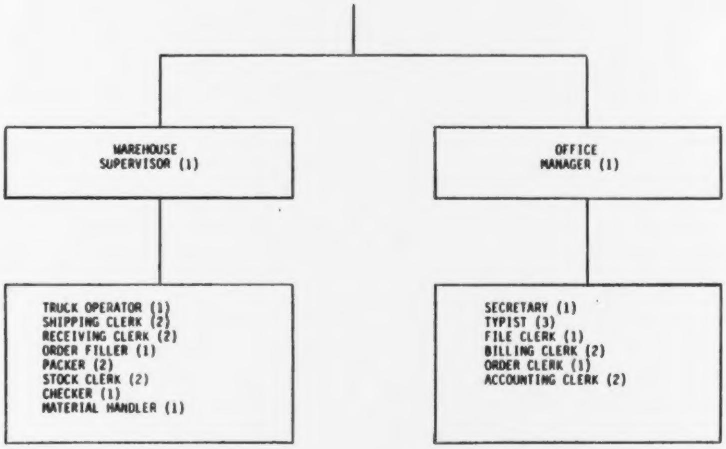
Size and Shape of Boxes

After determining the number of boxes needed for each level of the planned chart, select the box size and shape which will allow for proper spacing and room for captions. As a general rule, the larger the size of the boxes, the clearer the chart, provided there is sufficient space between boxes. Reduction in box size should be done only to conserve space. Boxes should be of uniform size and shape for the entire chart or within the same levels of the chart. Variations in box size between different levels should be made on the basis of chart balance, layout, and/or differences in types of units represented (e.g., job vs. department), rather than to indicate relative importance or status of units.

Box Captions

Box captions should be restricted to names of organizational subunits, unit functions, and official establishment job titles. Inclusion of more than one job-title caption in the same box (see Figure 9) can save chart space when it is unnecessary to show operating staff below the supervisor level as separate boxes. Numbers of positions may be added after the job titles. Avoid abbreviations where possible. When abbreviations are necessary, be sure they are comprehensible.

FIGURE 9
Several Job-Title Captions in Same Box

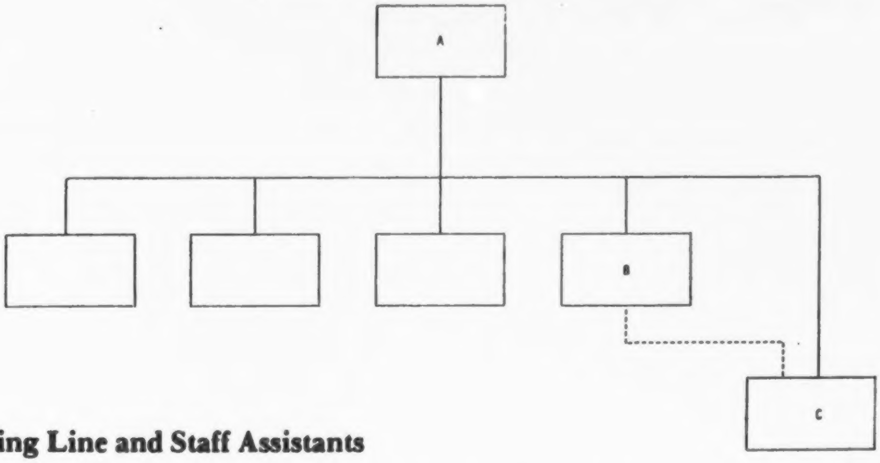

WAREHOUSE SUPERVISOR (1)
OFFICE MANAGER (1)
TRUCK OPERATOR (1)
SHIPPING CLERK (2)
RECEIVING CLERK (2)
ORDER FILLER (1)
PACKER (2)
STOCK CLERK (2)
CHECKER (1)
MATERIAL HANDLER (1)
SECRETARY (1)
TYPIST (3)
FILE CLERK (1)
BILLING CLERK (2)
ORDER CLERK (1)
ACCOUNTING CLERK (2)

Special Charting Situations

Dual Lines of Authority

When a worker reports to one supervisor for administrative supervision and to another for functional (technical) supervision, it is often desirable to show both relationships on the organization chart. Figure 10 shows Worker C reporting administratively to Worker A and functionally to Worker B. Note the necessity for placing Worker C at a lower chart level than Worker B to allow for charting functional authority as a dashed line, although both workers report administratively to Worker A and may very likely be of equal status in the company hierarchy.

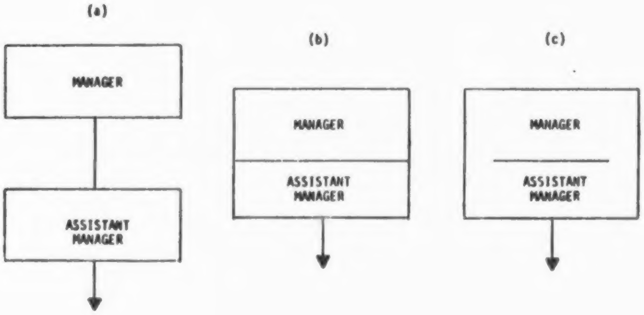
FIGURE 10
Charting Lines of Functional Authority



Charting Line and Staff Assistants

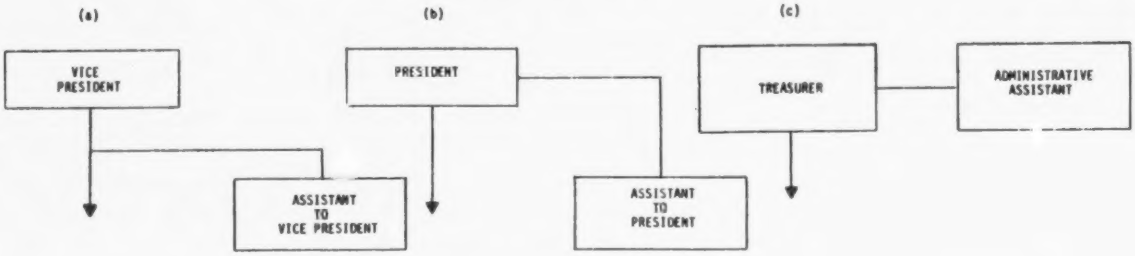
The line assistant may be shown as a distinct level of authority between the worker assisted and subordinate staff (see Figure 11a); or, in instances where the line assistant has duties and responsbilities which overlap significantly those of the supervisor, a common box with a total or partial dividing line may be used as an alternate technique (see Figures 11b and 11c).

FIGURE 11
Charting Line Assistants



The staff assistant who works primarily under the direction or supervision of one person may be depicted in any of the ways shown in Figure 12.

FIGURE 12
Charting Staff Assistants



Mechanics of Charting

Step-By-Step Construction of a Sample Organization Chart

Once the reporting relationships among the staff of an establishment are determined, there are certain procedures to follow to plan and construct an effective organization chart. These procedures are indicated and explained below in a step-by-step description of the construction of a sample chart for three production departments of the XYZ Company.

Staffing Data: The Department Managers of the Fabricating, Assembly, and Packaging Departments report to the Vice President, Manufacturing who, in turn, reports to the President. Each Department Manager is in charge of one or more units, staffed as follows:

Fabricating Department

Unit 1: Unit Supervisor; four Machine Operators (A, B, C, & D)
Unit 2: Unit Supervisor; three Machine Operators (A, B, & C)
Unit 3: Unit Supervisor; five Machine Operators (A, B, C, D, & E)

Assembly Department

Unit 4: Unit Supervisor; three Assemblers (A, B, & C)
Unit 5: Unit Supervisor; four Assemblers (A, B, C, & D)

Packaging Department

Unit 6: Unit Supervisor; four Packers (A, B, C, & D)

(All production workers report directly to Unit Supervisors)

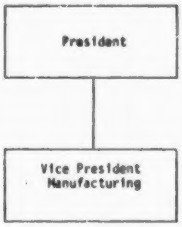
Step 1: Determine the number of authority levels to be shown on the chart and the number of chart boxes needed for each:

- Top level (President) - one box
- 2nd level (Vice-President, Manufacturing) - one box
- 3rd level (Department Managers) - three boxes
- 4th level (Unit Supervisors) - six boxes
- 5th level (Production Workers) - 23 boxes

Next, determine the number of chart levels needed. As previously stated, a chart level generally should contain no more than eight boxes; therefore, the 23 boxes comprising the 5th authority level (production workers) will require at least three chart levels, for a minimum total of seven for the entire chart. The total of 34 boxes indicates that the chart can easily be made to fit on a single page without overcrowding.

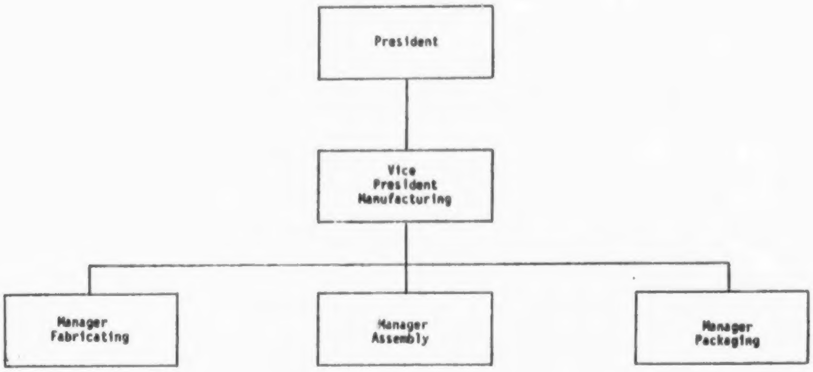
Step 2: Begin drawing a rough layout of the chart by starting with the top level and working downward. Select the approximate box size and shape, according to the anticipated number of boxes in each level and length of box captions.

FIGURE 13a


President
Vice President Manufacturing

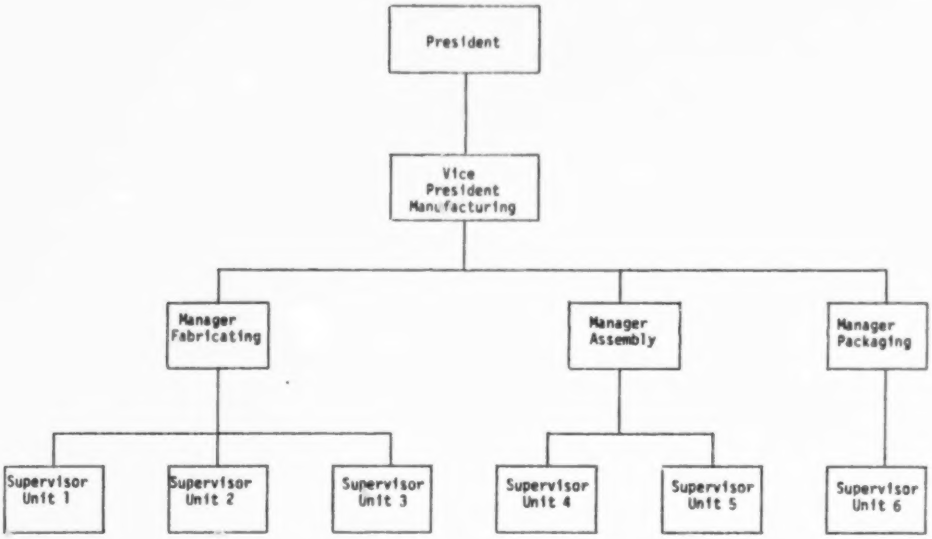
Step 3: Continue to 3rd authority level, using the preferred vertical lining to connect boxes, unless use of sidearm lining is indicated.

FIGURE 13b


President
Vice President Manufacturing
Manager Fabricating
Manager Assembly
Manager Packaging

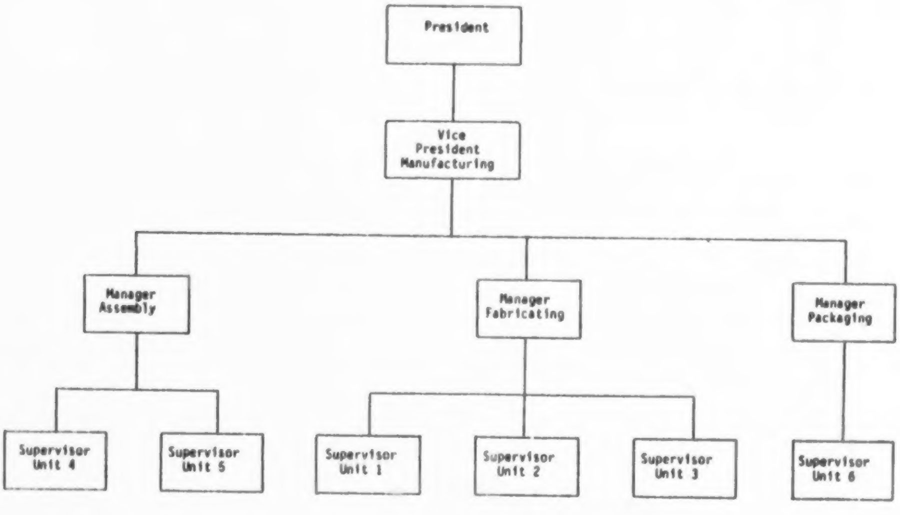
Step 4: Extend chart to 4th authority level, continuing to use vertical lining and scalar box arrangement.

FIGURE 13c


President
Vice President Manufacturing
Manager Fabricating
Manager Assembly
Manager Packaging
Supervisor Unit 1
Supervisor Unit 2
Supervisor Unit 3
Supervisor Unit 4
Supervisor Unit 5
Supervisor Unit 6

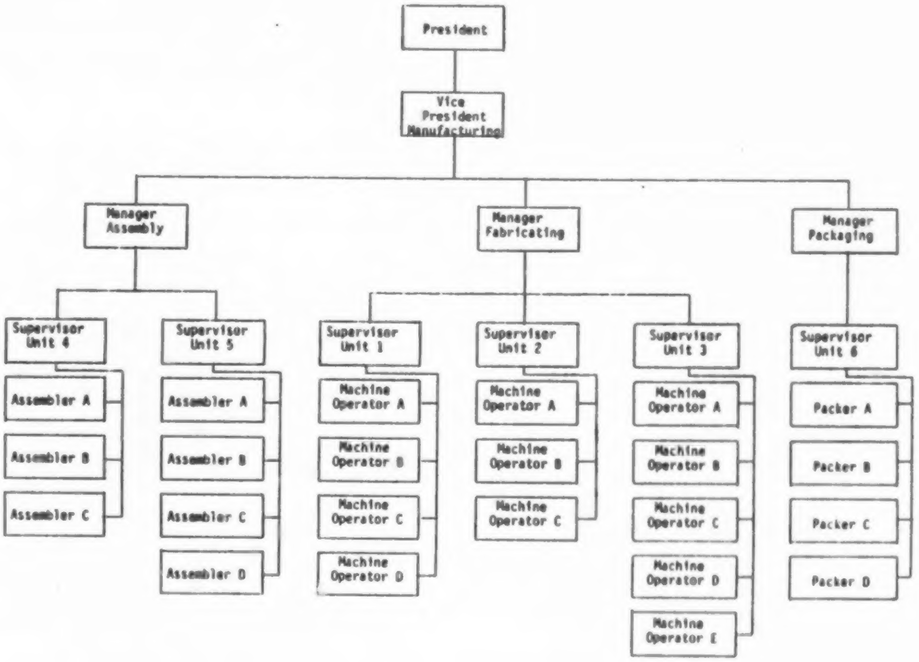
Step 5: Evaluate the chart for balance and adjust the placement of chart units accordingly. Better balance is achieved by placing the department with the most units in the center of the chart, as shown in Figure 13d. It is important to plan ahead at this stage, in terms of the effect that the boxes in the next lower chart level will have on the balance of the arrangement shown in Figure 13d. If, for example, the number of workers in the Assembly Department units were much larger than in the Fabricating Department units, then the revision of chart from Figure 13c to 13d would not have been necessary because the chart would have ultimately balanced.

FIGURE 13d


President
Vice President Manufacturing
Manager Assembly
Manager Fabricating
Manager Packaging
Supervisor Unit 4
Supervisor Unit 5
Supervisor Unit 1
Supervisor Unit 2
Supervisor Unit 3
Supervisor Unit 6

Step 6: Consider ways of extending the chart to the 5th authority level. Because of the number of boxes (23), it has been previously determined that three or more chart levels will be needed, based on a maximum of eight boxes per level. Therefore, it is obviously impossible to continue the chart as a scalar one. Charting of the boxes below each Unit Supervisor in double vertical rows, such as shown in Figure 8b, would result in a horizontal row of 12 boxes in the next chart level, also too many. A solution would be to chart the boxes as single vertical rows alined directly under the Unit Supervisor boxes and connected by sidearm lining, as shown in Figure 13e. This arrangement of boxes maintains the number of boxes in each horizontal row at no more than six, permits the continued usage of reasonably large boxes, and results in a well-balanced, easy-to-read organization chart.

FIGURE 13e


President
Vice President Manufacturing
Manager Assembly
Manager Fabricating
Manager Packaging
Supervisor Unit 4
Supervisor Unit 5
Supervisor Unit 1
Supervisor Unit 2
Supervisor Unit 3
Supervisor Unit 6
Assembler A
Assembler B
Assembler C
Assembler A
Assembler B
Assembler C
Assembler D
Machine Operator A
Machine Operator B
Machine Operator C
Machine Operator D
Machine Operator A
Machine Operator B
Machine Operator C
Machine Operator A
Machine Operator B
Machine Operator C
Machine Operator D
Machine Operator E
Packer A
Packer B
Packer C
Packer D

Use of Templates and Charting Aids

When the rough draft of the final chart is complete, the analyst may prefer to use only a pencil, pen, and ruler to chart the final copy, or to use additional charting aids, such as templates or tracing guides. Templates, which are plastic stencils of chart boxes of various sizes, are available commercially and can save considerable time. Tracing guides can be developed, each consisting of rows of boxes of specific number, size, shape, and spacing, drawn on paper in ink dark enough to show through a sheet of chart paper placed over it. A set of these guides would permit tracing of complete rows of boxes without the need for repositioning the guide for every box, as with a template.

CHAPTER 5

WORKFLOW CHARTS

Page

Components and Basic Formats of Workflow Charts Used in Job Analysis Studies 77

Charting the Processing of Materials into Products: The Manufacturing Workflow Chart.....78

Charting Nonmanufacturing Workflow 87

Workflow Charts From Literature 88

Explanation of Workflow Chart: A Chart Attachment 90

CHAPTER 5

WORKFLOW CHARTS

A workflow chart graphically depicts workflow in an establishment by outlining the types and sequences of operations undergone by materials, products, data, or people. It should provide a clear step-by-step picture of how the plant produces its product or otherwise meets its business objectives. The analyst conducting an establishment study must fully comprehend establishment processes and workflow if the analysis of jobs is to be complete and accurate. Preparation of a workflow chart not only provides a valuable supplement to other job analysis items prepared and becomes part of the establishment narrative report, but also provides a clear understanding of establishment operations. Workflow charts also provide valuable source material for the preparation of industry publications.

Components and Basic Formats of Workflow Charts Used in Job Analysis Studies

Simplicity and *clarity* are features of a well prepared workflow chart. Charting complex processes need not result in a confusing chart. Use of *boxes* and *arrows* as basic chart components produce the clearest type of workflow chart for purposes of job analysis studies. Each box represents a process phase in the workflow sequence and contains a *caption* (a title or description) of that process. For consistency, chart captions should be in gerund form, whenever possible. Boxes should be of uniform size throughout the chart, their size dictated by the number of boxes in the chart and the lengths of the captions. Arrows, indicators of path and direction of workflow, should consist of solid lines and run in vertical-horizontal directions only; curved and diagonal arrows are more difficult to follow visually. The heads of the arrows need only appear at the end-point at which the arrow meets the next box; arrows denoting two-way direction may be headed at both ends. Crossing of arrows should be avoided if possible; but when occurring, the horizontal arrow loops over the vertical one. Captions may occasionally appear outside chart boxes along or near one or more arrows to impart some information about the workflow not specific to any one process or to identify specific materials or components following separate process paths. A chart *heading* containing establishment identification, date of study, and name of product or service must be included.

Avoid charting more than one discrete process in the same box, even if accomplished by the same worker or on the same machine. Processes should not be combined into a single box and given captions, such as "Gum Making" or "Fabricating." For processes involving machines and equipment the caption should reflect what the machine or equipment does rather than what the worker does. In other words, the caption should reflect the process rather than the worker action, such as "Baking" (bread) rather than "Tending" (oven).

78

The format and layout of the workflow chart may vary according to the complexity of workflow, the number of process stages involved, and the originality of the analyst. The directon of the chart's graphic flow should be essentially from the top to the bottom of an 8½ x 11 inch page. However, the number of boxes and/or the complexity of the workflow variations may require use of space-saving conventions, such as charting workflow in "U" or "snaking" configurations.

If the clarity of the chart is impaired by its complexity, it can be broken down into two or more charts, each depicting a different product or service. It may also be possible to confine such a chart to one page by showing only the common or typical workflow paths rather than all conceivable variations.

An attachment to a workflow chart, which defines and explains each captioned process is helpful for a full understanding of the processes involved. The Explanation of Workflow Chart, prepared by government occupational analysts as part of the Narrative Report, is discussed in Chapter 18, with an example appearing in Appendix E, pp 430-431.

Charting the Processing of Materials into Products: The Manufacturing Workflow Chart

The production of some products involves a simple workflow sequence in which one process always follows another with no possible variation. Other products require a variety of process steps on several materials and/or product lines, resulting in complex workflow variations in the number and sequence of steps involved. This section of the chapter covers the charting of the processing of materials into products to construct what is sometimes known as the manufacturing workflow chart or process-flow chart.

Charting Simple Process-Flow Sequences

When the manufacturing processes follow each other in invariable sequence, the charting of the workflow is simple. Figure 1 shows the workflow for the fabrication of purchased wire into staples. Except for the size of the staple and the gage of the wire, the product never varies in shape or in the way it is made. Figure 2 is an example of a simple but lengthier workflow chart showing the sequential process steps in the manufacture of optical lenses. Note how the "U" configuration format conserves chart space.

FIGURE 1
Workflow Chart
Wire Staples, 9/71

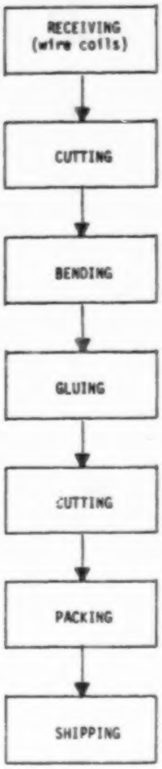
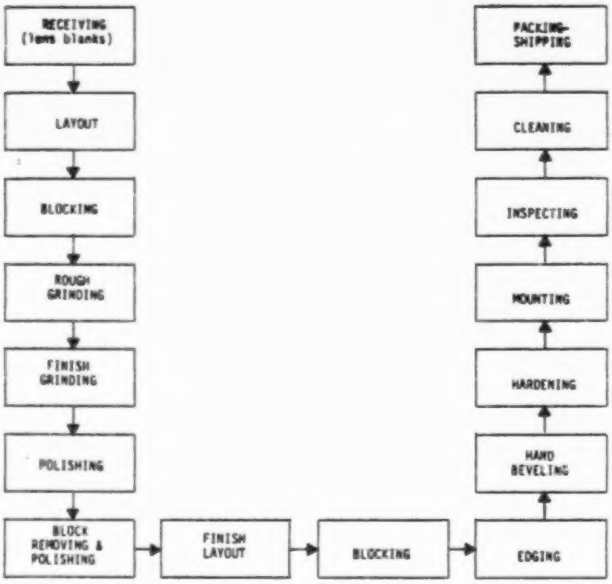

RECEIVING (wire coils)
CUTTING
BENDING
GLUING
CUTTING
PACKING
SHIPPING

FIGURE 2
Workflow Chart
Optical Lenses, 4/70


RECEIVING (lens blanks)
LAYOUT
BLOCKING
ROUGH GRINDING
FINISH GRINDING
POLISHING
BLOCK REMOVING & POLISHING
FINISH LAYOUT
BLOCKING
EDGING
HAND BEVELING
HARDENING
MOUNTING
INSPECTING
CLEANING
PACKING-SHIPPING

In planning a chart, first determine the number and types of processes performed on the product, how finely they should be broken down (i.e., subprocesses), and the number of possible workflow variations. A broad process, such as Machining, would be suitable as a caption in a chart box for a product undergoing fabrication by a number of metalworking machines in no particular sequence of machining operations. On the other hand, if a product always undergoes a specific sequence of machining operations, each operation should be charted as a separate box.

Another factor in breaking out processes for charting purposes is whether a process constitutes a significant step in the production of a product. For example, the bundling and tying together of a product preparatory to the next process step need not be shown in the workflow chart if it is done merely to facilitate transport to the next operation. However, if such inprocess wrapping is essential to the manufacture of the product, such as a method of assembly, its inclusion in the chart would be necessary. It is often questionable whether to reflect inspecting, storing, loading, moving, and transporting as process steps on the workflow chart and, if so, at which points.

Inspecting: As a product is manufactured, inspections are frequently carried out at numerous process points and with varying degrees of thoroughness and precision, ranging from cursory visual examinations for readily apparent defects to exacting gage and instrument measurements. Depending on the methods of quality control necessitated by the nature of the product and/or by the standards of the establishment, the inspection function may be the secondary responsibility of many workers or the primary responsibility of specialized inspectors and testers. In deciding whether to chart the inspecton function, determine if this activity is distinct and important enough to include. If so, the points in the workflow that seem to be critical inspection points should be identified and chart boxes for "Inspecting" drawn only at those points.

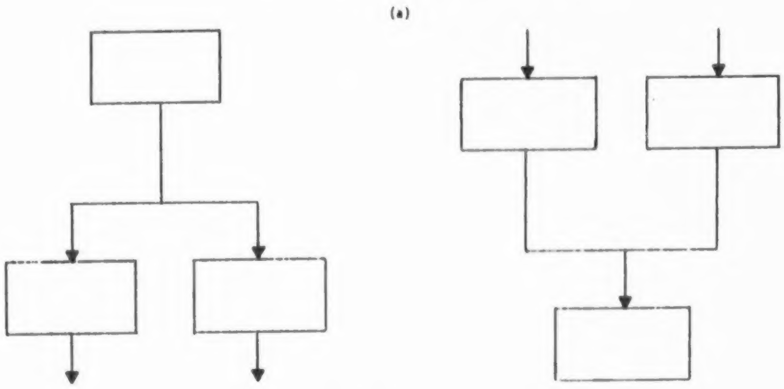
Storing: It may be important to indicate on the workflow chart whether the product is made on a job-order basis, is stored to enable immediate filling of anticipated future orders, or both. A box depicting "Storing" or "Stocking" can be included on the chart, generally before a box for "Shipping." For some products, storing may occur at a point where the product is partially processed so that finishing operations can be done upon receipt of the customer orders specifying style, model, or other requirements.

Movement of materials and products: Activities, such as loading, moving, hoisting, conveying, and transporting products *between jobsites*, should generally not be shown as boxes on the workflow chart; though such functions are critical to the flow of work, they are accounted for graphically by the chart's arrows. Transporting products from the establishment to the customer or vendor, however, is frequently shown as the final chart box.

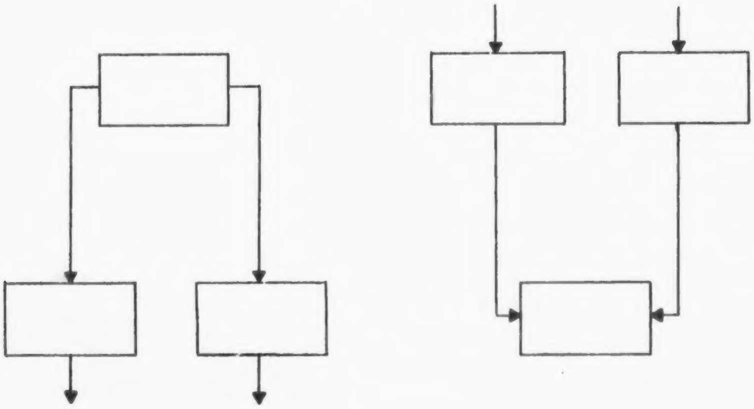
Charting Workflow Variations

As the purpose of the chart lines is a graphic depiction of the workflow paths, it is important to link boxes with lines in a manner that gives a clear picture of downward flow. The examples in Figure 3 represent acceptable lining techniques for charting divergent and convergent processes.

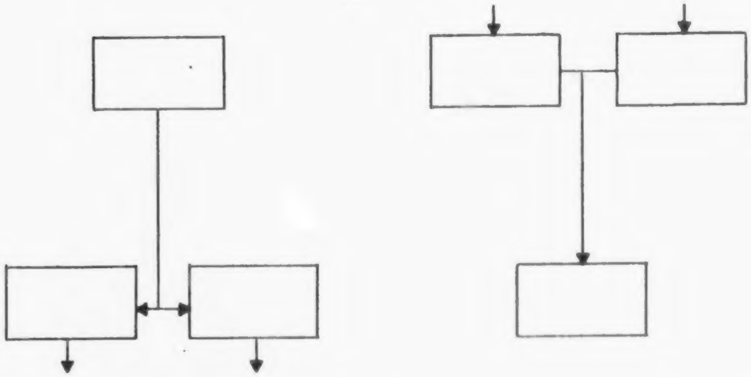
FIGURE 3
Charting Divergent and Convergent Processes



(b)

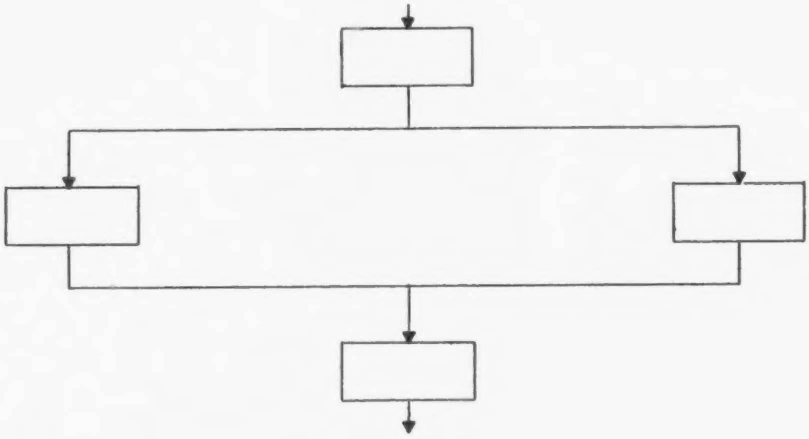


(c)



Frequently workflow charts must show variations of workflow. Simple charting techniques can be applied so that charts can be easily drawn. The following examples of theoretical chart segments are intended to illustrate recommended methods of charting workflow variations. Divergence of workflow to alternate processes is clearly shown in Figure 4.

FIGURE 4



When a specific process is *sometimes bypassed,* it can be charted in one of the two ways shown in Figures 5 and 6. If the process is *most often bypassed,* its chart box can be placed out of the vertical alinement of the preceding and following boxes, as shown in Figure 5. If the process is *most often not bypassed,* the flow line rather than the box should be placed alongside the vertical alinement of the preceding and following boxes, as shown in Figure 6.

FIGURE 5

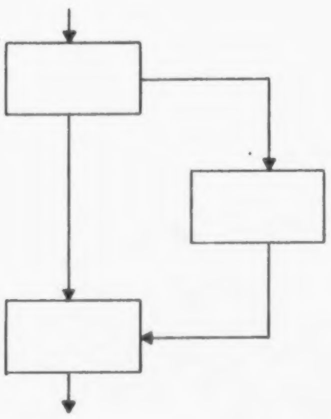
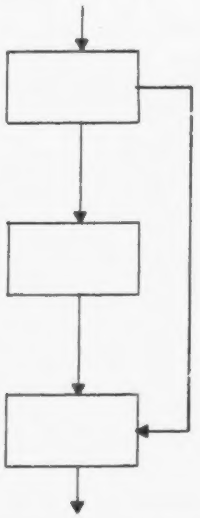
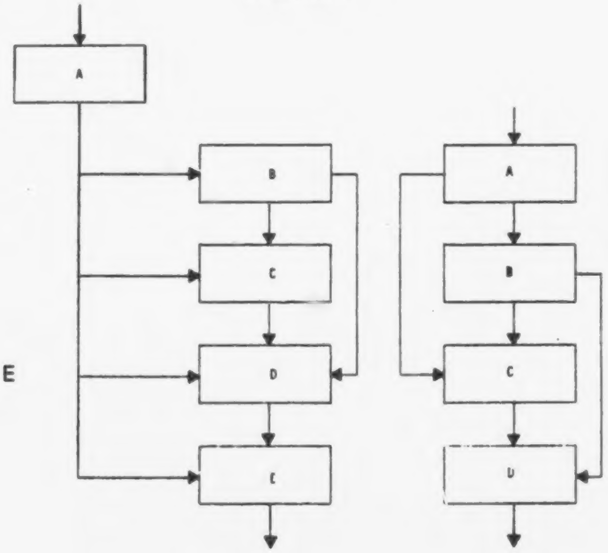


FIGURE 6



As more complex variations are encountered, the number of workflow variations increase. The examples in Figure 7 illustrate how to chart several alternate workflow possibilities.

FIGURE 7



Possible flow paths:

A to E
A to D to E
A to B to D to E
A to C to D to E
A to B to C to D to E

Possible flow paths:

A to B to D
A to C to D
A to B to C to D

When materials undergo only a few processing variations, the workflow may be charted much like the example in Figure 8. Figure 9 illustrates a further degree of workflow complexity.

FIGURE 8
Workflow Chart
Oakum Pipe Covering, 6/71

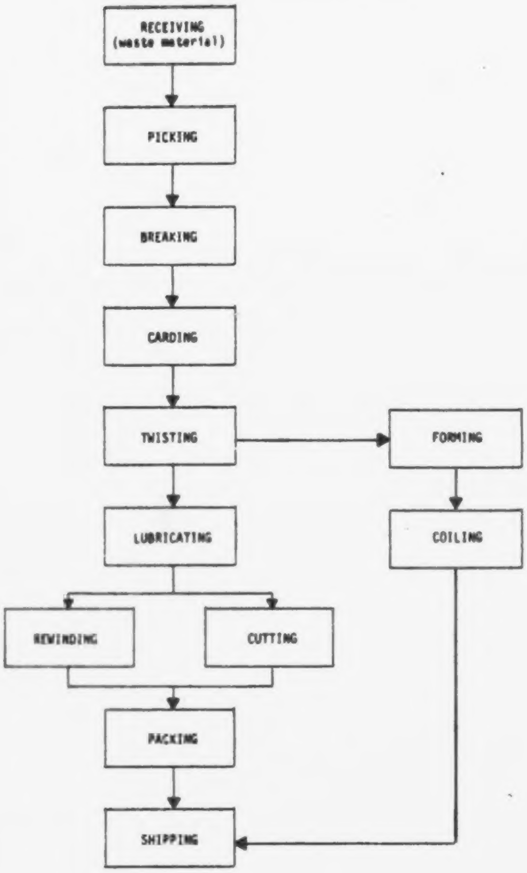

RECEIVING (waste material)
PICKING
BREAKING
CARDING
TWISTING
FORMING
LUBRICATING
COILING
REWINDING
CUTTING
PACKING
SHIPPING

FIGURE 9
Workflow Chart
Metal Buttons, 12/70

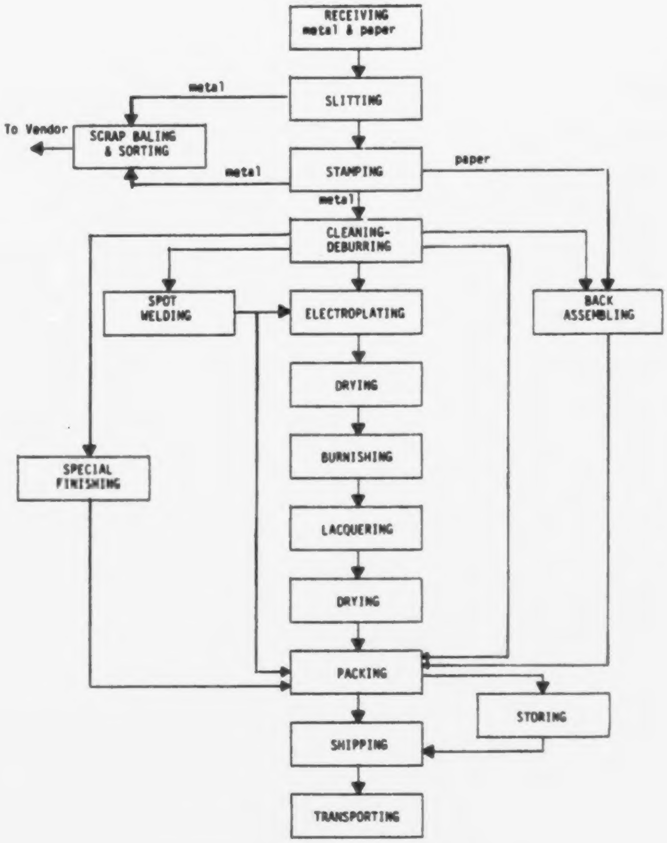
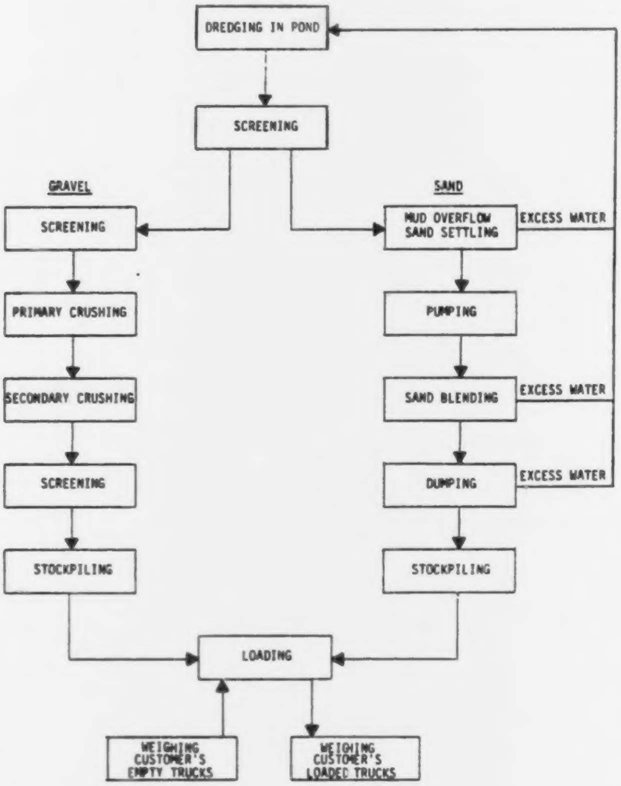

RECEIVING metal & paper
metal
SLITTING
To Vendor
SCRAP BALING & SORTING
metal
STAMPING
paper
metal
CLEANING-DEBURRING
SPOT WELDING
ELECTROPLATING
BACK ASSEMBLING
DRYING
SPECIAL FINISHING
BURNISHING
LACQUERING
DRYING
PACKING
STORING
SHIPPING
TRANSPORTING

Figure 10 illustrates how two product lines undergoing different processes can be shown in a single chart. The first two processes and the last two are the same for both products. Also shown is a process by-product (excess water), which returns to the site of the first process.

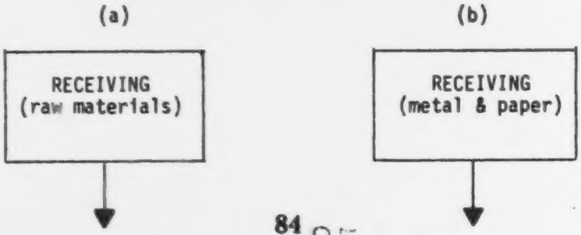
FIGURE 10
Workflow Chart
Sand and Gravel, 8/71


DREDGING IN POND
SCREENING
GRAVEL
SAND
SCREENING
MUD OVERFLOW SAND SETTLING
EXCESS WATER
PRIMARY CRUSHING
PUMPING
SECONDARY CRUSHING
SAND BLENDING
EXCESS WATER
SCREENING
DUMPING
EXCESS WATER
STOCKPILING
STOCKPILING
LOADING
WEIGHING CUSTOMER'S EMPTY TRUCKS
WEIGHING CUSTOMER'S LOADED TRUCKS

Indicating Workflow of Materials

Workflow in the manufacturing establishment logically begins with the receipt of materials: the workflow chart should therefore start with "Receiving" as the first or top box. The extent to which materials should be specified by type and the manner in which they should be charted depends on the number of materials and whether they are processed separately. For products requiring many materials, it may be unnecessary or too complex to enumerate them or to designate their specific workflow paths or points of entry into the process sequence (see Figure 11a). When products are composed of only a few materials, the materials can easily be identified at the outset in the Receiving box of the chart (see Figure 11b).

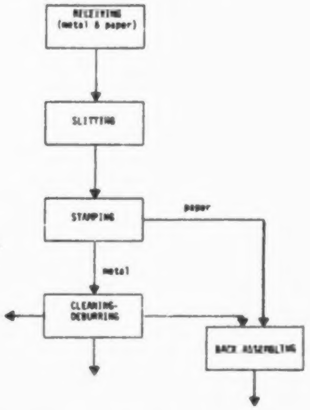
FIGURE 11
Showing Materials in Chart Box


(a)

(b)
RECEIVING (raw materials)
RECEIVING (metal & paper)

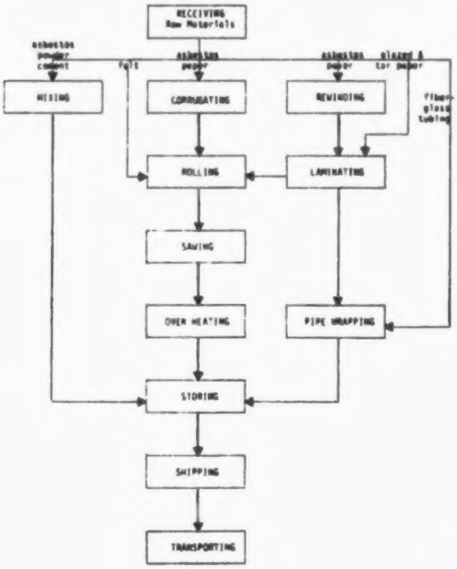
To elaborate further on the above example, early identification of the materials as part of the box caption is especially important in showing initial identical processing and eventual divergence of workflow of each material. In Figure 12, the materials captioned along chart arrows below their point of divergence (Stamping) are accounted for in the Receiving box caption; it is clear that no other materials are used.

FIGURE 12
Showing Materials Along Arrows of Chart


RECEIVING (metal & paper)
SLITTING
STAMPING
paper
metal
CLEANING-DEBURRING
BACK ASSEMBLING

Another charting situation, illustrated in Figure 13, is one in which several materials enter the workflow at various points to end up as a lesser number of finished products. The materials are too numerous to identify in the Receiving box, but are easily identified by captions along the chart arrow.

FIGURE 13
Convergence of Materials at Various Processing Stages


RECEIVING Raw Materials
asbestos powder cement
felt
asbestos paper
asbestos paper
glazed & tar paper
fiber-glass tubing
MIXING
CORRUGATING
REWINDING
ROLLING
LAMINATING
SAWING
OVEN HEATING
PIPE WRAPPING
STORING
SHIPPING
TRANSPORTING

Another illustration of identifying materials on a workflow chart is shown in a portion of a chart (Figure 14) showing materials used in related products which are processed differently.

FIGURE 14
Divergence of Materials for Different Products

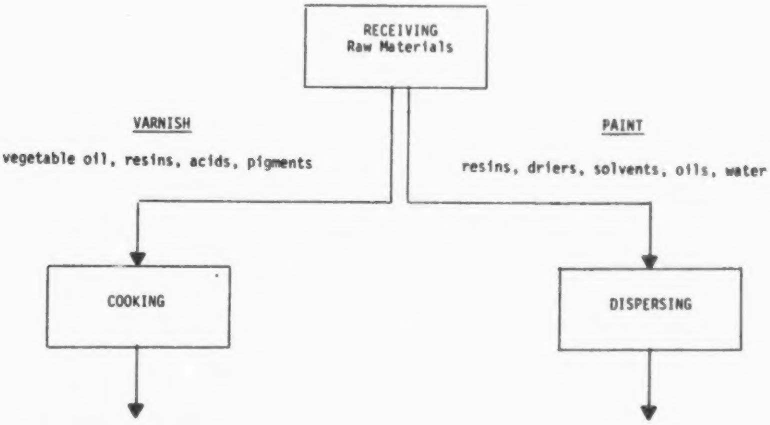
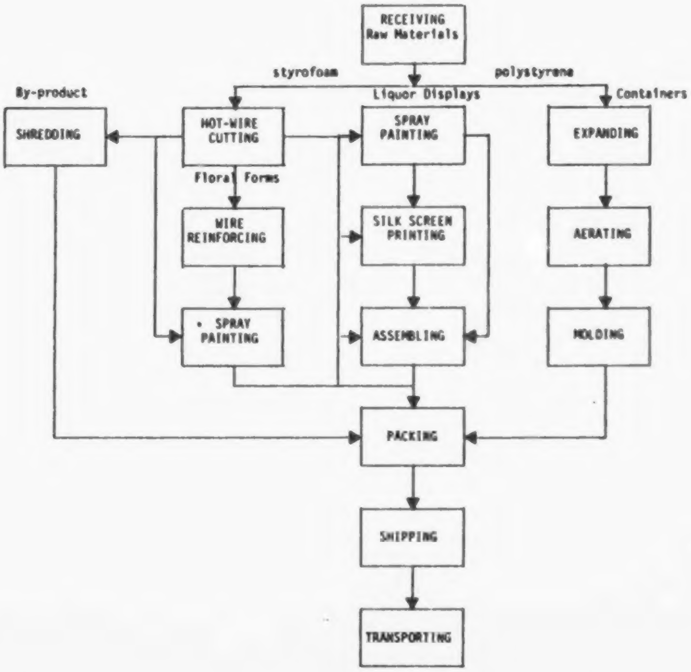

RECEIVING
Raw Materials
VARNISH
vegetable oil, resins, acids, pigments
PAINT
resins, driers, solvents, oils, water
COOKING
DISPERSING

Figure 15 also shows variations in workflow according to materials, product, and number of process operations required.

FIGURE 15
Workflow Chart
Polystyrene Containers and Styrofoam Displays, Forms, and Filler, 10/72


RECEIVING
Raw Materials
styrofoam
polystyrene
By-product
Liquor Displays
Containers
SHREDDING
HOT-WIRE CUTTING
SPRAY PAINTING
EXPANDING
Floral Forms
WIRE REINFORCING
SILK SCREEN PRINTING
AERATING
• SPRAY PAINTING
ASSEMBLING
MOLDING
PACKING
SHIPPING
TRANSPORTING

Charting Nonmanufacturing Workflow

The activities of nonmanufacturing establishments, such as those engaged in providing services or distributing processed products, can be flow-charted in much the same way as for manufacturing establishments.

In planning a workflow chart for a service establishment, determine if the nature of the service primarily involves a series of activities involving doing things directly to or for the customer or client, or developing and processing data on forms and records, or both. For example, the services of an employment agency may be charted according to the sequence of direct services provided for the job applicant: Application Taking, Information Giving, Qualifications Assessing, Job-Order Screening, Employer Contacting and Soliciting, Referring, and Following-up. An additional chart may be drawn for the same establishment showing how data is compiled and processed on various forms for each service rendered. Service workflow charts need not be extremely detailed and complex. In most cases an analyst can figure out logical stages of the flow of services and chart them accordingly.

The following series of workflow charts illustrate some ways in which nonmanufacturing processes can be charted: included are the warehousing and wholesale distributing of beer (Figure 16); the collecting of blood from donors (Figure 17); the processing of dogs and cats in an animal shelter (Figure 18); and the client services of a rehabilitation workshop (Figure 19).

FIGURE 16
Workflow Chart
Wholesale Beer Distributor, 11/72

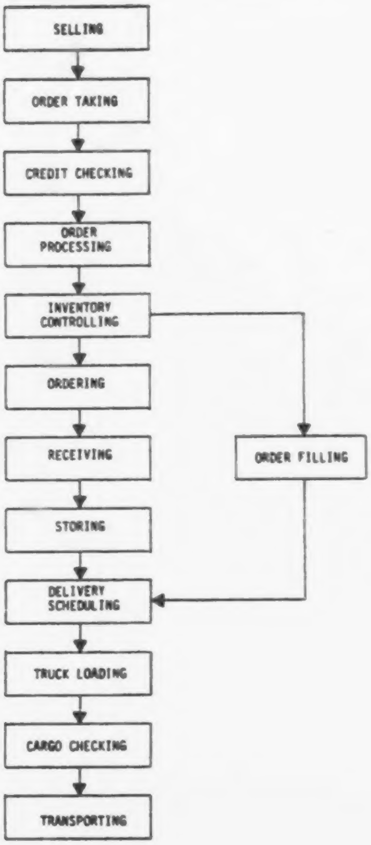

SELLING
ORDER TAKING
CREDIT CHECKING
ORDER PROCESSING
INVENTORY CONTROLLING
ORDERING
RECEIVING
STORING
DELIVERY SCHEDULING
TRUCK LOADING
CARGO CHECKING
TRANSPORTING
ORDER FILLING

FIGURE 17
Workflow Chart
Blood Collection Unit, 8/73

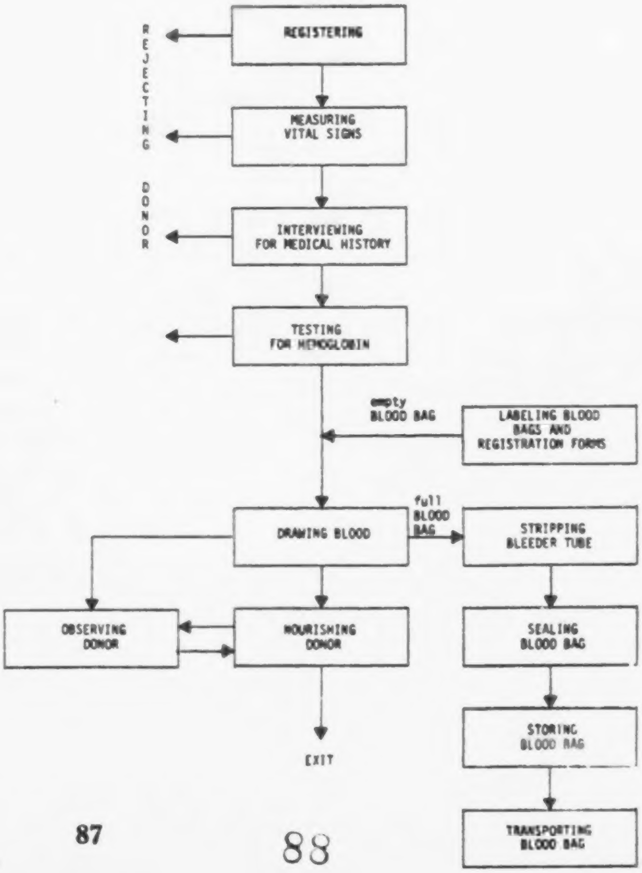

REJECTING DONOR
REGISTERING
MEASURING VITAL SIGNS
INTERVIEWING FOR MEDICAL HISTORY
TESTING FOR HEMOGLOBIN
empty BLOOD BAG
LABELING BLOOD BAGS AND REGISTRATION FORMS
DRAWING BLOOD
full BLOOD BAG
STRIPPING BLEEDER TUBE
OBSERVING DONOR
NOURISHING DONOR
SEALING BLOOD BAG
STORING BLOOD BAG
EXIT
TRANSPORTING BLOOD BAG

FIGURE 18
Workflow Chart
Animal Shelter, 10/72

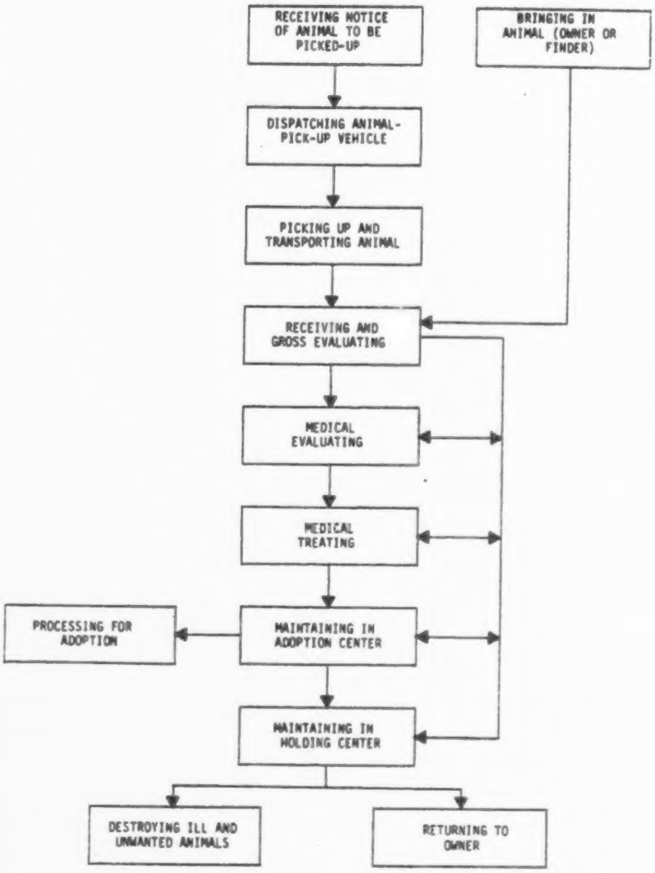
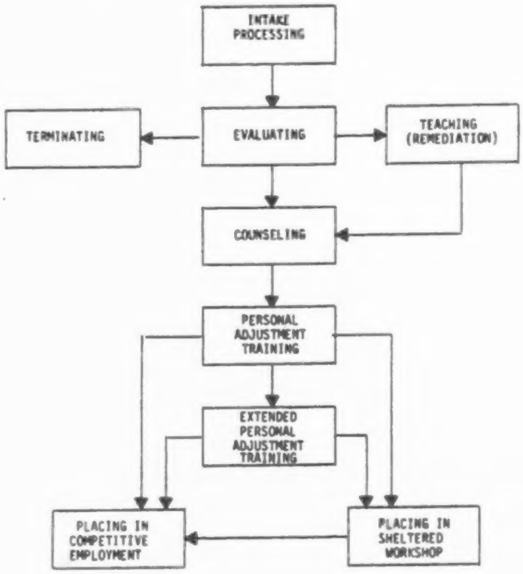

RECEIVING NOTICE OF ANIMAL TO BE PICKED-UP
BRINGING IN ANIMAL (OWNER OR FINDER)
DISPATCHING ANIMAL-PICK-UP VEHICLE
PICKING UP AND TRANSPORTING ANIMAL
RECEIVING AND GROSS EVALUATING
MEDICAL EVALUATING
MEDICAL TREATING
PROCESSING FOR ADOPTION
MAINTAINING IN ADOPTION CENTER
MAINTAINING IN HOLDING CENTER
DESTROYING ILL AND UNWANTED ANIMALS
RETURNING TO OWNER

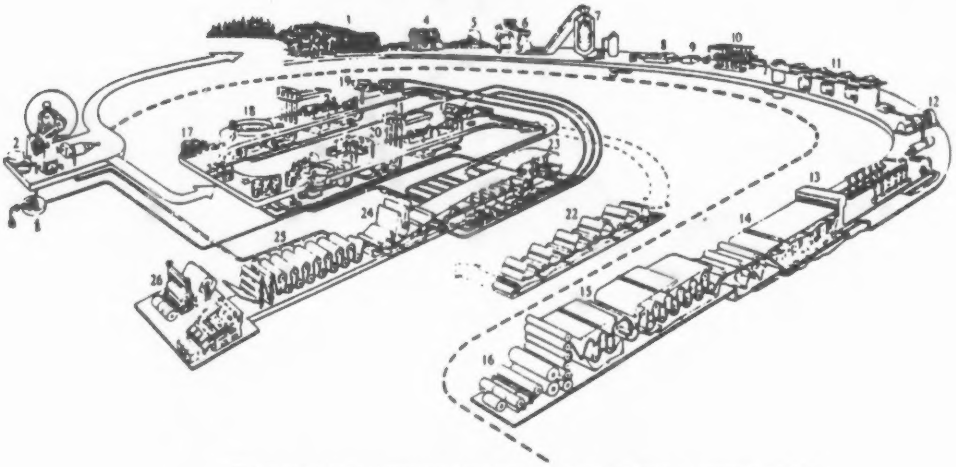
FIGURE 19
Workflow Chart
Counseling Services of Nonprofit Agency, 3/73


INTAKE PROCESSING
TERMINATING
EVALUATING
TEACHING (REMEDIATION)
COUNSELING
PERSONAL ADJUSTMENT TRAINING
EXTENDED PERSONAL ADJUSTMENT TRAINING
PLACING IN COMPETITIVE EMPLOYMENT
PLACING IN SHELTERED WORKSHOP

Workflow Charts From Literature

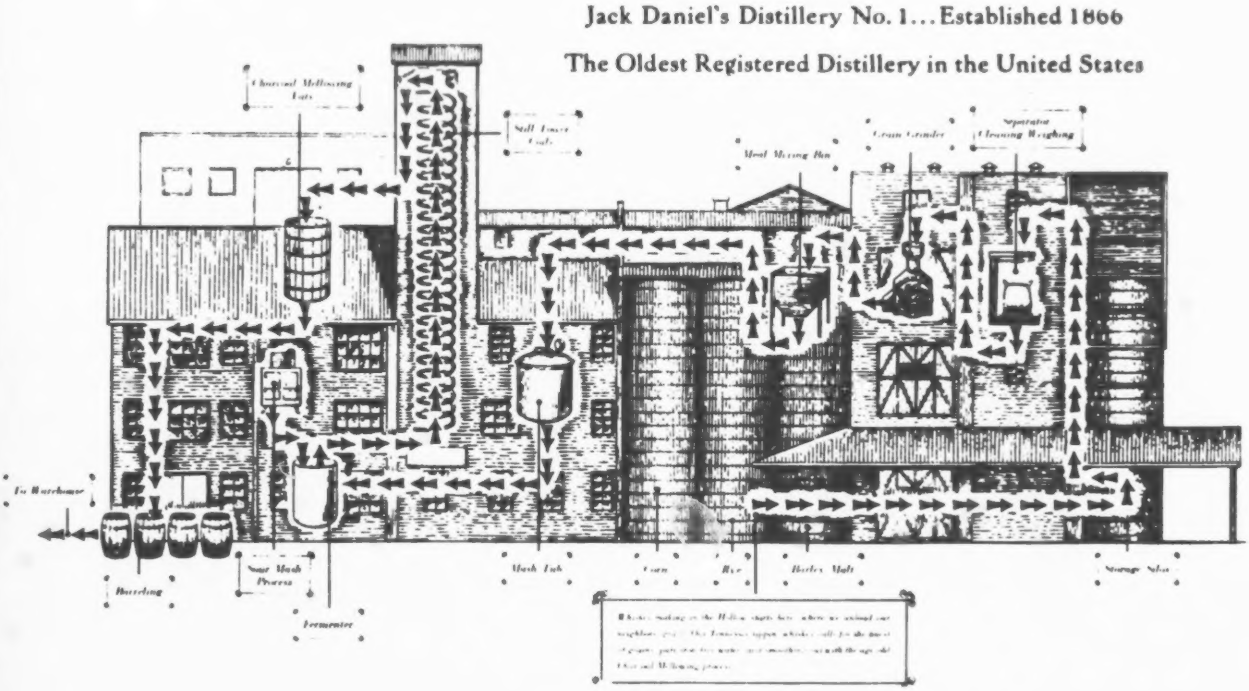
The analyst can occasionally find well-prepared workflow charts in company, industry, and technical reference publications. These charts may be reproduced by photocopying for use in a job analysis study, but must be referenced as to source. Some published charts show workflow along with pictures of the equipment used at each stage, such as the examples in Figures 20 and 21. It is not necessary to take the time to draw original versions of charts of this complexity.

FIGURE 20
How Paper is Made[1]


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

The chart above illustrates the three principal methods of manufacturing paper and paperboard: Fourdrinier; Inverform; and Cylinder. The outside flow diagram shows paperboard making: 1) water supply 2) fuel supply 3) pulp wood 4) barker 5) chipper 6) screen 7) digester 8) washers 9) screen 10) cleaners 11) bleaching 12) refiner 13) head box 14) Fourdrinier 15) dryers 16) winder and slitter 17) baled wood pulp 18) hydrapulper 19) head box 20) instrument panel 21) Jordan head box 22) Inverform 23) primary press in cylinder method 24) main presses 25) dryers 26) slitting and sheeting.

FIGURE 21
How Whiskey is Made[2]


Jack Daniel's Distillery No. 1... Established 1866
The Oldest Registered Distillery in the United States
Charcoal Mellowing Vats
Still Tower Coils
Meal Mixing Bin
Grain Grinder
Separation Cleaning Weighing
To Warehouse
Barreling
Sour Mash Process
Fermenter
Mash Tub
Corn
Rye
Barley Malt
Storage Silos

---

[1] From "The Pulp and Paper Industry" in *The Encyclopedia of Careers and Vocational Guidance, Volume I*, William Hopke (ed.), J. G. Ferguson Publishing Co., Chicago, 1967, p. 566.

[2] From advertising brochure, Jack Daniel's Distillery, Lynchburg, Tennessee.

BEST COPY AVAILABLE

Explanation of Workflow Chart: A Chart Attachment

A source of supplemental information about establishment workflow and processes is needed to ensure that the workflow chart is completely understandable to a reader unfamiliar with the industry and product or service of the establishment, and to relate processes to jobs. All significant establishment processes, including those on the chart, must be concisely and comprehensively defined, described, and interrelated in a chart attachment titled "Explanation of Workflow Chart." The following are some rules for preparing a clear and effective Explanation of Workflow Chart:

- All charted work processes should be clearly and concisely defined and/or described in sequential order.
- Process captions should correspond with those on the workflow chart.
- Uncharted processes, such as Transporting, Loading-Moving, and Hoisting-Conveying, should be described along with the charted processes occurring immediately before or after. Processes involving the physical movement of materials within the establishment are not usually charted.
- Process descriptions should be compatible in content and terminology with data in the Job Analysis Reports and other job analysis items.
- Process descriptions should refer to establishment titles of workers involved in that process and to Job Analysis Report ID numbers, if any.
- The Explanation of Workflow Chart should contain all supplemental information necessary to fully understand the process flow, such as secondary and outside-the-plant operations, by-product disposition and pre- or post-processing by supplier or customer.

An example of a Workflow Chart and an Explanation of Workflow Chart appear in Appendix E, pp. 430-431.

91

PART 2

JOB ANALYSIS COMPONENTS

CHAPTER 6

WORKER FUNCTIONS

Page

Structure of Worker Functions 95

Estimating the Worker Functions that Characterize a Job....................96

Indicating if the Job is Data, People, or Things Oriented....................97

Definitions and Examples of Worker Functions 98

CHAPTER 6

WORKER FUNCTIONS

Worker functions are activities which identify worker relationships to data, people, and things. These relationships are expressed by the following 24 Worker Function factors used by the United States Employment Service in job analysis:

Data	People	Things
0 Synthesizing	0 Mentoring	0 Setting Up
1 Coordinating	1 Negotiating	1 Precision Working
2 Analyzing	2 Instructing	2 Operating-Controlling
3 Compiling	3 Supervising	3 Driving-Operating
4 Computing	4 Diverting	4 Manipulating
5 Copying	5 Persuading	5 Tending
6 Comparing	6 Speaking-Signaling	6 Feeding-Offbearing
	7 Serving	7 Handling
	8 Taking Instructions-Helping	

Each worker function depicts a broad action which summarizes what the worker does in relation to data, people, and things. The combination of the three worker functions that best represent the most characteristic functional relationships for a given job provides a useful analytic device to structure the analysis of the job and which, in fact, is used as part of the occupational code in the *Dictionary of Occupational Titles*[1].

Structure of Worker Functions

Although the arrangement of the worker functions within each of the three categories is structured to suggest an upward progression from the less complex to the more complex functions, there are numerous instances where hierarchical relationships among them are limited, imprecise, reversed, or nonexistent. For this reason, the prime value of worker functions in job analysis is to reflect the nature of the worker's data, people, and things relationships, not to indicate job complexity.

Data functions can best be described as an arrangement of different kinds of activities, some broad in scope and others narrow, with considerable overlap among them with regard to complexity. Computing and Copying are much more specialized types of functional activities than the other data functions.

---

[1] *Dictionary of Occupational Titles* (4th ed., Washington: U.S. Department of Labor, 1977).

People functions also reflect different kinds of activities with little or no hierarchical aspects to their arrangement. Beyond generalizing that Taking Instructions-Helping is usually the least complex people function, the remaining functions are in no specific order which denotes "levels."

Things functions can be divided into two parts: machine[2] and nonmachine related. The nonmachine related things functions represent three levels of complexity, as shown in Figure 1.

FIGURE 1
Three Levels of Nonmachine-Related Things Worker Functions

Nonmachine-Related Levels	Level of Judgment
1 Precision Working	Considerable judgment
4 Manipulating	Some latitude for judgment
7 Handling	Little or no latitude for judgment

The machine-related things functions are only partially hierarchical; i.e., Operating-Controlling, by definition, requires more judgment than tending, but Setting Up may be of lower, higher, or equal complexity to Operating-Controlling, depending on the specific nature of the set-up involved. Driving-Operating jobs may range in complexity from that of Airplane Pilot to Fork-Lift-Truck Operator.

Estimating the Worker Functions that Characterize a Job

Carefully read the definitions of the worker functions and the examples that follow each definition, and compare with the activities of the job studied. Select the data, people, and things worker functions that best characterize the job as a whole. The worker functions selected should relate to the accomplishment of the overall purpose of the job and to activities that best express the important worker involvement in the job.

---

[2] Machine, as used here, means machine or equipment.

It is not necessarily the highest function present that best characterizes the job as a whole, but the one most characteristic of the job. In some cases, the amount of time spent in an activity will determine whether a particular worker function is most characteristic. In other cases, the contribution of an activity to the purpose of the job will determine the selection of a worker function, despite other functional activities being more frequent. In short, differentiate the incidental from the essential work activities when determining which worker functions best reflect the essence of the job.

When selecting the appropriate Things worker function, some additional concepts should be applied: (1) determine the level of complexity of the worker's relationship to Things — precision working, manipulating, or handling — based on the degree of judgment involved, then (2) decide whether the worker relates to several kinds of things, in which machines sometimes are one of the kinds of things included, or whether the situation is a special case in which the worker is concerned almost exclusively with one or more machines or pieces of equipment. In the special cases, assign the appropriate machine-related Things worker function.

Indicating if the Job is Data, People, or Things Oriented

Additional information is provided about the worker functions of a job by indicating the most characteristic relationship of the worker to data, people, and/or things. After estimating whether the job is essentially a "data job," "people job," "things job," or a job in which some combination of data, people, and things is predominant, based on an evaluation of the work performed, select the worker functions that best characterize the job. Figure 2 shows the seven possible patterns of worker function orientation and an example of each.

FIGURE 2
Patterns and Examples of Worker Relationships to Data, People, and Things (D P T)

Patterns of Worker Function Orientation	Example	Predominant Functions			
			D	P	T
Data	Mathematician	Synthesizing	(0)	6	7
People	Usher	Serving	6	(7)	7
Things	Material Handler	Handling	6	8	(7)
Data-People	Employment Interviewer	Analyzing Speaking-Signaling	(2)	(6)	7
Data-Things	Typist	Copying Operating-Controlling	(5)	8	(2)
People-Things	Amusement-Ride Operator	Speaking-Signaling Driving-Operating	6	(6)	(3)
Data-People-Things	Dentist	Coordinating Mentoring Precision Working	(1)	(0)	(1)

Definitions and Examples of Worker Functions

DATA: Information, knowledge, and conceptions, related to data, people, or things, obtained by observation, investigation, interpretation, visualization, and mental creation. Data are intangible and include numbers, words, symbols, ideas, concepts, and oral verbalization.

0 **Synthesizing:** Integrating analyses of data to discover facts and/or develop knowledge concepts of interpretations.

- Examples:

Creates satirical or humorous cartoons based on personal interpretations of current news events.

Writes critical reviews of literary, musical, or artistic works and performances for broadcast and publication.

Interprets play scripts and conducts rehearsals for stage presentation.

Formulates hypotheses and experimental designs to investigate problems of growth, intelligence, learning, personality, and sensory processes.

Directs choral group rehearsals and performances to achieve desired effects, such as tonal and harmonic balance, dynamics, rhythms, tempos, and shadings.

Conducts research to discover new uses for chemical by-products, and devises new procedures for preparing organic compounds.

Creates musical compositions, using knowledge of harmonic, rhythmic, melodic, and tonal structure, and other elements of music theory.

Formulates editorial policies of newspaper and originates plans for special features or projects.

Interprets serious or comic parts by speech or gesture to portray role in theatrical production.

Creates and teaches original dances for ballet, musical, or revue to be performed for stage, television, nightclub, or motion picture production.

1 **Coordinating:** Determining time, place, and/or sequence of operations or actions on the basis of analysis of data; and implementing decisions. Does not include planning one's own work.

- Examples:

Plans, directs, and coordinates activities of designated project to insure that aims, goals, or objectives are accomplished in accordance with prescribed priorities, time limitations, and funding conditions.

Plans and arranges for activities of radio or television studio and control room personnel to insure technical quality of pictures and sound for programs originating in studio or from remote pickup points.

Coordinates movement of air traffic between altitude sectors and control centers to provide maximum separation and safety for aircraft.

Directs the routing and controlling of oil through pipelines from wells and storage tanks to delivery points, in accordance with delivery obligations and deadlines.

Plans itinerary and schedules travel accommodations for military and civilian personnel and dependents according to travel orders, using knowledge of routes, types of carriers, and travel regulations.

Plans advertising campaign to promote sale of merchandise.

Plans and establishes collection routes and directs assignment of personnel and equipment in the operation of a municipal sanitation department.

Authorizes number and frequency of buses traveling over established city routes to meet the transportation needs of patrons.

Arranges activities of public and private housing projects to relocate residents, in accordance with relocation regulations, facilities, and services.

Plans and directs milk plant activities, such as pasteurizing, separating, evaporating, drying, cooling, and bottling, in the processing of milk products.

2 **Analyzing:** Examining and evaluating data. Presenting alternative actions in relation to the evaluation is frequently involved.

- Examples:

Examines food service records and tastes food and beverage samples to determine sales appeal and cost of preparing and serving meals and beverages in food establishments.

Observes and listens to engine to diagnose causes of engine malfunction.

Evaluates student loan applications and determines eligibility based on need and academic standing.

Examines incoming weather data and plots anticipated weather developments on maps and charts.

Reviews and evaluates scouting reports in preparing defensive plans for football team.

Assays mineral samples taken from outcrops, floats, and stream channels for preliminary quantitative estimates of mineral content.

Investigates and evaluates consumer complaints at source and attempts to find solution, using knowledge of product.

Studies blueprints and operation of machinery or equipment in plant and evaluates deviations from original specifications to resolve problems.

Analyzes water in purification plant to control chemical processes which soften it or make it suitable for drinking.

Examines works of art, such as paintings, sculpture, and antiques, to determine their authenticity and value.

3 **Compiling:** Gathering, collating, or classifying information about data, people, or things. Reporting and/or carrying out a prescribed action in relation to the information is frequently involved. Includes gathering information about materials and products from blueprints, samples, and written specifications and taking actions, such as adjusting machines or equipment, to achieve conformance to standard.

- Examples:

Operates wire-drawing machine, observing operation of machine as work progresses and making adjustments to conform to written specifications.

Classifies aircraft flight data and submits data to Dispatcher for approval and flight authorization.

Collects, clarifies, and records forest data, such as rainfall, stream flow, and soil moisture, to develop information tables.

Summarizes details of transactions in separate ledgers and transfers data to general ledger to maintain records of financial transactions of an establishment.

Collects and arranges flight arrival and departure times at specified points to construct flight schedule.

Receives telephone complaints from public concerning crimes and police emergencies, records complaints, and files them for future processing.

Catalogs library materials, such as books, films, and periodicals, according to subject matter.

Sells footwear, such as shoes, boots, overshoes, and slippers in department store.

Sets up metal-stamping machines for other workers, according to product specifications and prescribed procedures.

Prepares specialty foods, such as tacos and fish and chips, according to recipe and specific methods applicable to type of cookery.

4 **Computing:** Performing arithmetic operations and reporting on and/or carrying out a prescribed action in relation to them. Includes operation of calculating machines. Does not include counting.

- Examples:

Calculates cost of customers' laundry by pricing each item on customers' lists, using adding machine, calculating machine, or comptometer.

Calculates interest and principal payments on mortgage loans, using calculating machine.

Figures and quotes repair cost estimates for hosiery and gloves.

Figures daily wages of miners from production records.

Totals payments and proves daily transactions in car-rental establishment.

Makes change for payment received for food bill, cashes checks, and issues receipts or tickets to customers.

Calculates freight or passenger charges payable to participating carriers, using rate table and calculating machine.

Determines customer telephone charge, according to time consumed, type of call, and rate of mileage zone.

Determines cost to customer of water conditioner based on frequency of service and size of unit required.

5 **Copying:** Transcribing, entering, or posting data by hand or keyboard-type machine. Does not include copying by use of photocopy or other duplicating equipment.

- Examples:

Enters information on manifest, such as name of shipper, tonnage, and destination, from bills of lading and shipper's declaration.

Records meter readings, such as oil, steam, temperature, and pressure, on company operating chart.

Transcribes written data from production department to punchcards by means of keypunch machine.

Enters test scores of applicants on permanent office record form.

Transcribes addresses from mailing list to envelopes, cards, advertising literature, packages, and similar items.

Records quantity and length of hides from tag on bundle.

Types letters, reports, stencils, forms, or other straight copy material from corrected rough draft.

Records color, quantity, material, and part number from work ticket onto production report.

Posts totals of checks and drafts to clearing-house settlement sheets.

Records odometer reading and amount of gas and oil used during refueling, in vehicle logbook.

6 **Comparing:** Distinguishing the readily observable functional, structural, or compositional characteristics of data, people, or things.

- Examples:

Inspects loaded freight cars to ascertain that materials and goods, such as automobiles, lumber, or containers of explosives, are securely braced and blocked according to loading specifications.

Sorts and inspects telephone charge tickets for such billing information as destination of telegraph message and accuracy of telephone number to which charges are made.

Compares invoices of incoming articles with actual numbers and weights of articles.

Grades dressed poultry, according to size and quality.

Sorts burned clay products, such as brick, roofing tile, and sewer pipe, according to form, color, and service characteristics.

Selects seasoned logs, following specification on work ticket, and examines wood for moisture content, following specified percentages.

Inspects candy in containers or on conveyor to insure that it is formed, coated, cupped, wrapped, or packed according to plant standards.

Examines painted surfaces of automobile to detect scratches, blemishes, and thin spots.

Sorts and stacks hats, according to color, size and style specified.

Inspects washed automobiles at end of automatic carwash line to insure completeness of wash job.

PEOPLE: Human beings; also animals dealt with on an individual basis as if they were human.

0 **Mentoring:** Dealing with individuals in terms of their total personality in order to advise, counsel, and/or guide them with regard to problems that may be resolved by legal, scientific, clinical, spiritual, and/or other professional principles.

- Examples:

Provides financial counseling to individuals in debt.

Works out plans with parents, teachers, and children for overcoming problems in children who have behavioral, personality, or scholastic difficulties.

Counsels clients in legal matters.

Works with parolees to assist them in rehabilitation and contacts employers to promote job opportunities for them.

Provides treatment for individuals with mental and emotional disorders.

Provides individuals with vocational and educational planning services, based on appraisal of their interests, aptitudes, temperaments, and other personality factors.

Guides juvenile campers by maintaining discipline, leading groups, and instructing individuals.

Assists foreign students in making academic, social, and environmental adjustments to campus and community life.

Provides spiritual and moral guidance and assistance to congregation members.

Diagnoses and treats diseases and disorders of animals.

1 **Negotiating:** Exchanging ideas, information, and opinions with others to formulate policies and programs and or arrive jointly at decisions , conclusions, or solutions.

- Examples:

Negotiates with property owners and public officials to secure purchase or lease of land and right-of-way for utility lines, pipelines, and other construction projects.

Contacts landowners and representatives of oil-producing firms in attempt to complete agreements, such as leases, options, and royalty contracts covering oil exploration, drilling, and production activities in specified oilfields.

Arranges with officials of various organizations in each locality to rent premises for circus, to arrange for distribution of publicity and promotional materials, and to hire musicians for circus band.

Participates in talks to settle labor disputes. Confers with union members and prepares cases for presentation. Meets with employers to negotiate or arbitrate.

Confers with foreign shippers to agree upon reciprocal freight-handling contract.

Contracts with hospitals and other institutional agencies for students to obtain clinical experience in school of nursing.

Meets with representatives of entertainment attractions, such as troupes, performers, or motion picture distributors, to arrange terms of contract and fees to be paid for engagement in establishments, such as nightclubs, theaters, or dancehalls.

Contracts with farmers to raise or purchase fruit or vegetable crops.

Consults with members of welfare board to plan activities and expenditures.

Confers with editorial committee and heads of production, advertising, and circulation departments of newspaper to develop editorial and operating procedures and negotiate decisions affecting publication of newspaper.

2 **Instructing:** Teaching subject matter to others, or training others (including animals) through explanation, demonstration, and supervised practice.

- Examples:

  Trains nursing staff in techniques of industrial nursing. Conducts classes in first aid and home nursing for employees.

  Conducts classes in instrumental or vocal music for individuals or groups in public or private school.

  Provides training for police recruits in police science investigative methods and techniques, government, law, community life, marksmanship, self-defense, and care of firearms.

  Trains wild animals, such as lions, tigers, bears, and elephants, to perform tricks for entertainment of audience at circus or other exhibitions.

  Teaches one or more subjects in college or university classroom.

  Coaches groups at playgrounds and schools in fundamentals and rules of competitive sports. Demonstrates techniques of game and drills players in fundamentals until they are familiar with all phases.

  Lectures, demonstrates, and uses audiovisual teaching aids to present subject matter to class.

  Lectures and demonstrates job fundamentals to flight attendants of passenger airline.

  Instructs workers in painting decorations on plates, bowls, saucers, and other dinnerware.

3 **Supervising:** Determining or interpreting work procedures for a group of workers, assigning specific duties to them, maintaining harmonious relations among them, and promoting efficiency. A variety of other responsibilities is frequently involved in some combination, such as training workers; evaluating workers' performance; assisting workers in solving work problems; initiating and/or recommending personnel actions, such as hiring, firing, promoting, transferring, and disciplining; enforcing company regulations; and maintaining or directing maintenance of production and personnel records.

- Examples:

  Assigns guard force personnel to station or patrols. Interprets security rules and supervises subordinates in carrying out rules. Reports irregularities and hazards to appropriate personnel. Selects and trains subordinates. Insures that safety standards are maintained.

Supervises and coordinates activities of workers engaged in loading ships' cargoes. Studies bills of lading to determine sequence of loading operations, calculates number of hours and personnel required, and assigns tasks to workers. Oversees workers to insure cargo is loaded in proper sequence.

Issues oral and written orders to newspaper workers engaged in gathering, writing, and publishing one type of news, such as sports, society, music, or drama.

Directs activities of workers engaged in distributing material to other workers and keeping records of parts worked on and completed.

Inspects engines and other equipment and orders ship's crew to repair or replace defective parts.

Assigns duties to typists and examines typed material for accuracy, neatness, and conformance to standards.

Interviews, hires, and gives instructions to crew of fishing vessel, and assigns crew to watches and quarters. Directs fishing operations, using knowledge of fishing grounds and workload capacities of vessel and crew.

Establishes work procedures for workers engaged in loading and unloading kiln to dry green hops. Examines hops on kiln floor to determine distribution for drying, and gives instructions to workers concerning depth hops may be piled in kiln bay and kiln temperature and air volume to be maintained.

Directs workers engaged in maintaining grounds and turf on golf course. Determines work priority and assigns workers to tasks, such as fertilizing, seeding, mowing, raking, and spraying. Observes employees' work and demonstrates more efficient work methods.

Assigns bricklayers to specific duties. Inspects work in progress to determine conformance to specifications and trains new workers.

4 **Diverting:** Amusing others, usually through the medium of stage, screen, television, or radio.

- Examples:

Portrays role in dramatic production to entertain audience.

Sings classical, opera, church, or folk music in musical programs.

Performs classical, modern, or acrobatic dances alone, with partner, or in groups to entertain audience.

Induces hypnotic trance in subjects, occasionally using members of audience as subjects, and commands hypnotized subjects to perform specific activities.

Speaks in such manner that voice appears to come from source other than own vocal chords, such as from dummy or hand puppet.

Pilots airplane to perform stunts and aerial acrobatics at fairs and carnivals.

Drives racing car over track in competition with other drivers.

Performs difficult and spectacular feats, such as leaping, tumbling, and balancing, alone or as member of team.

Professes to judge patron's character by studying their handwriting, observing details of letter formation.

Impersonates Santa Claus during Christmas season.

Performs original and stock tricks of illusion and sleight of hand to mystify audience, using props, such as cards and cigarettes. Frequently uses members of audience in act.

5 **Persuading:** Influencing others in favor of a product, service, or point of view, directly or by telecommunications.

- Examples:

Sells services of industrial psychology firms to management officials.

Calls on farmers to solicit repair business and to sell new milking equipment. Demonstrates milking machines.

Offers articles at auction, asking for bids, attempting to stimulate buying desire of bidders and closing sales to highest bidder.

Sells all types of life insurance by pointing out company programs that meet clients' insurance needs.

Solicits membership for club or trade association. Visits or contacts prospective members to explain benefits and cost of membership and to describe organization and objective of club or association.

Contacts individuals and firms by telephone and in person to solicit funds for charitable organization.

Sells home appliances to customer after pointing out salable features of merchandise.

Calls on retail outlets to suggest merchandising advantages of company's trading stamp plan.

Promotes use of and sells ethical drugs and other pharmaceutical products to doctors, dentists, hospitals, and retail and wholesale drug establishments.

6 **Speaking-Signaling:** Talking with and/or signaling people to convey or exchange information. Includes giving assignments and/or directions to helpers or assistants.

- Examples:

Directs traffic by motioning with flag when construction work obstructs normal traffic route.

Gives property coordinator verbal directions in placing of items on stage or set.

Informs public on library activities, facilities, rules, and services.

Indicates customer bid by word, mannerism, hand, or other characteristic signal.

Interviews job applicants in employment agency.

Answers questions from passengers concerning train routes, stations, and timetable information.

Informs tourists concerning size, value, and history of establishment; points out features of interest; and gives other information peculiar to establishment.

Answers telephone to give information about company's special services to potential customers.

Signals or relays signals to operators of hoisting equipment engaged in raising or lowering loads and pumping or conveying materials.

Explains hunting and fishing laws to sporting groups.

7 **Serving:** Attending to the needs or requests of people or animals or the expressed or implicit wishes of people. Immediate response is involved.

- Examples:

Accompanies and assists ambulance driver on calls. Assists in lifting patient onto wheeled cart or stretcher and into and out of ambulance. Renders first aid, such as bandaging, splinting, and administering oxygen.

Renders variety of personal services conducive to safety and comfort of airline passengers during flight.

Carries golf bags around golf course for players, handing clubs to players as requested.

Cares for elderly, handicapped, or convalescent people. Acts as aid or friend by attending to employer's personal, business, or social needs.

Arranges wearing apparel and checks personal effects for performers and other personnel when they are on set.

Feeds and waters animals in zoo.

Mixes and serves alcoholic and nonalcoholic drinks to patrons of bar, following standard recipes.

Bathes and gives alcohol rubs to hospital patients.

Cleans and polishes footwear for customers.

Escorts hotel guests to rooms, assists them with luggage, and offers information pertaining to available services and facilities of hotel.

8 **Taking Instructions-Helping:** Receiving and acting upon the instructions or orders of another individual.

- Examples:

Drives forklift to move, hoist, and stack cartons of materials in warehouse, following oral instructions of supervisor and written work orders.

Tests ballpoint pen cartridges to determine conformity to company specifications, referring to test procedures.

Folds garments for bagging or boxing, following guide marks on table or using folding board.

Keeps complete set of records of financial transactions of establishment.

Inspects, assembles, and packs mounted or unmounted negatives, color film transparencies, and photographic prints.

Weighs and mixes seasonings and other ingredients to prepare spice mixes, according to formula.

THINGS: Inanimate objects as distinguished from human beings; substances or materials; machines, tools, equipment, and products. A thing is tangible and has shape, form, and other physical characteristics.

0 **Setting Up:** Adjusting machines or equipment by replacing or altering tools, jigs, fixtures, and attachments to prepare them to perform their functions, change their performance, or restore their proper functioning if they break down. Workers who set up one or a number of machines for other workers, or who set up and personally operate a variety of machines or a single multi-purpose machine, such as a universal woodworking machine, are included here. Setting up may range considerably in complexity based on the degree of judgment required to replace or alter tooling and to make adjustments, and the degree of standardization of procedures involved.

- Examples:

Selects, positions, and secures cutters in toolhead, in spindle, or on arbor of gear cutting machines, such as gear shapers, hobbers, and generators. Sets feed rates and rotation speeds of cutters and workpiece in relation to each other by selecting and mounting gears, cams, or templates, or by moving levers. Moves controls to set cutting speeds and depth of stroke and cut for reciprocating cutters, and to position tools and workpieces.

Unlocks paramutual-ticket-dispensing machines before each race at racetrack, using key, and turns knob to reset number register to zero. Changes code slug so that different symbols are printed on tickets. Replaces depleted roll of ticket tape, threading end of tape through feed roller to type roller. Presses key of machine to obtain sample ticket and examines correctness and clarity of print. Adjusts machine to correct defects. Relocks machine.

Selects and positions, alines, and secures electrodes, jigs, holding fixtures, guides, and stops on resistance welding and brazing machines.

Lifts specified die sections into die-casting machines that cast parts, such as automobile trim, carburetor housing, and motor parts, from nonferrous metals. Secures die sections in position and adjusts stroke of rams. Connects water hoses to cooling system of die. Preheats die sections. Turns valves and sets dials to regulate flow of water circulating through dies. Starts machine to produce sample casting and examines casting to verify setup.

Selects, installs, and adjusts saw blades, cutter heads, boring bits, and sanding belts in variety of woodworking machines, using handtools and rules. Operates machines to saw, smooth, shape, bore, and sand lumber and wood parts. Periodically verifies dimensions of parts for adherence to specifications, using gages and templates.

Threads perforated tape through numerically-controlled routing machine, inserts precision indicator in machine chuck, and depresses switches to jog chuck into contact with workpiece, synchronize tape and tool, and record setup point. Loads and secures cutting tool and holder. Starts machine, observes operation, and compares numerical data displays with specifications on operation sheets and with own measurements of workpiece.

1 **Precision Working:** Using body members and/or tools or work aids to work, move, guide, or place objects or materials in situations where ultimate responsibility for the attainment of standards occurs and selection of appropriate tools, objects, or materials, and the adjustment of the tool to the task require exercise of considerable judgment.

- Examples:

Repairs and maintains production machinery in accordance with blueprints, diagrams, operation manuals, and manufacturer's specifications, using handtools, power tools, and precision-measuring and testing instruments.

Lays out position of parts on metal, using scribe and handtools.

Locates and marks reference lines and marks location of holes to be drilled, using scribe.

Sketches original designs for textile cloth patterns on graph paper, using water colors, brushes, pen, and rulers.

Carves statues, monuments, and ornaments from stone, concrete, and wood, using chisels, hammers, and knives.

Fits and assembles machine components according to assembly blueprints, manuals, engineering specifications, sketches, and knowledge of machine construction procedures, using handtools and power tools. Sets up and operates metalworking machines to shape parts for precise fit.

Lays out, cuts, shapes, and finishes wood, plastics, plexiglass, and hardboard parts of displays, using handtools.

Prepares scale and full size drawings for use by building contractors and craft workers.

Diagnoses electrical malfunctions, using test lights, ohmmeters, voltmeters, circuit simulators, and wiring diagrams.

Cuts, trims, and tapers hair, using clippers, comb, and scissors.

Measures, marks, and cuts carpeting and linoleum with knife to get maximum number of usable pieces from standard size rolls, following floor dimensions and diagrams.

Forms sand molds for production of metal castings, using handtools, power tools, patterns, and flasks and applying knowledge of variables, such as metal characteristics, molding sand, contours of patterns, and pouring procedures.

2 **Operating-Controlling:** Starting, stopping, controlling, and adjusting the progress of a machine or equipment. Operating involves setting up and adjusting the machine or material(s) as the work progresses. Controlling involves observing gages, dials, etc. and turning valves and other devices to regulate factors such as temperature, pressure, flow of liquids, speed of pumps, and reactions of materials. Involves some latitude for judgment with regard to determining when and to what degree to control or adjust the machines or equipment. Included are situations in which the worker can be considered an extension of the machine, either as the holder and guider of the material or holder and guider of the tool.

- Examples:

Turns controls on television camera; observes scenes through camera monitor; adjusts lens to maintain scenes in focus; and moves levers to alter angle or distance of shot to photograph scenes for broadcasting.

Types alphabetic or numeric input data on keyboard of computer terminal from source documents. Inserts paper into carriage, presses key to obtain printout or video display of data, and backspaces and strikes over original material, using keyboard, to correct errors. Presses code key to transmit corrected data via telephone lines to computer.

Attaches abrasive wheel or belt to drive mechanism of bench-mounted polishing machine. Starts machine and moves and presses workpiece against revolving wheel or belt to remove metal and surface defects until desired finish is attained.

Moves lever to regulate speed of turntable of tape recorder machines. Turns knobs on cutting arms to shift or adjust weight of stylus. Moves switches to open microphone and tune in live or recorded programs.

Places wooden barrel horizontally on barrel rest of barrel-lathe machine. Clamps barrel between two chucks of lathe. Starts machine and holds barrel plane against surface of revolving barrel while guiding tool along its length to scrape and smooth it.

Places glass blanks and tube components in chuck or tailstock of lathes and depresses pedals of compressed air devices that lock parts in lathes. Starts lathes, lights gas-torch heating elements, and turns valves to regulate flames. Turns handwheels or pushes levers to control heating of specified areas of glass parts.

Places spool on spindle of floor-mounted sewing machines. Draws thread through machine guides, tensions, and needle eye. Inserts bobbins into shuttles and draws thread through slots in shuttle walls or draws thread through guides and looper eyes. Presses knee levers, depresses pedals, or moves hand levers to raise presser foot or spread feed cups. Positions parts to be joined and lowers presser foot. Starts, stops, and controls speed of machines with pedals or knee levers and guides parts under needles.

Moves switches on central control panel of switchboard to regulate converters. Observes demand meters, gages, and recording instruments, and moves controls to insure efficient power utilization, equipment operation, and maintenance of power distribution. Monitors gages, alarms, and oscilloscopes to detect and prevent damage to equipment and disruption of power.

Types letters, reports, and other straight copy material, using electric typewriter.

Fires furnace or kiln, observes gages, and adjusts controls to maintain specified temperature for drying coal and ore before or after washing, milling, or pelletizing operations.

Regulates flow and pressure of gas from mains to fuel feed lines of gas-fired boilers, furnaces, kilns, soaking pits, smelters, and related steam-generating or heating equipment. Opens valve on feed lines to supply adequate gas for fuel, and closes valves to reduce gas pressure. Observes, records, and reports flow and pressure gage readings on gas mains and fuel feed lines.

3 **Driving-Operating:** Starting, stopping, and controlling the actions of machines or equipment for which a course must be steered or guided, in order to fabricate, process, and/or move things or people. Involves such activities as observing gages and dials; estimating distances and determining speed and direction of other objects; turning cranks and wheels; pushing or pulling gear lifts or levers. Includes such machines as cranes, conveyor systems, tractors, furnace-charging machines, paving machines, and hoisting machines. Excludes manually powered devices, such as handtrucks and dollies, and power-assisted machines, such as electric wheelbarrows and handtrucks.

- Examples:

Steers vessel over course indicated by electronic equipment, such as radio, fathometer, and land radar, to transport passengers to fishing locations for catching fish and other marine life.

Pushes pedals and pulls levers to move, control speed, and stop crane boom, and raise or lower cables attached to load. Adjusts controls to move and position load by sight or at direction of other worker.

Pilots airplane or helicopter over agricultural fields at low altitudes to dust or spray fields with seeds, fertilizers, or pesticides.

Operates throttle, air brakes, and other controls to transport passengers or freight on electric, diesel-electric, steam, or gas-turbine-electric locomotive. Interprets train orders, block or semaphore signals, and railroad rules and regulations.

Fastens attachments, such as graders, plows, and rollers, to tractor with hitchpins. Releases brake, shifts gears, and depresses accelerator or moves throttle to control forward and backward movement of machine. Steers tractor by turning steering wheel and depressing brake pedals.

Pushes levers and pedals to move machine, to lower and position dipper into material, and to lift, swing, and dump contents of dipper into truck, car, or onto conveyor or stock pile.

Moves control levers, cables, or other devices to control movement of elevator. Opens and closes safety gate and door of elevator at each floor where stop is made.

Controls movement and stops railroad or mine cars by switching, applying brakes, placing sprags (rods) between wheelspokes, or placing wooden wedges between wheel and rail. Positions cars under loading chutes by inserting pinch bar under car wheels, using bar as fulcrum and lever to move car. Hooks cable drum brake to ease car down incline.

Moves controls to drive armored car to deliver money and valuables to business establishments.

Controls action of rail-mounted trackmobile to spot railroad cars on ramp above chip storage bins for unloading, and releases bottom doors of cars allowing chips to fall into bin.

Moves controls to activate rotary brushes and spray so that sweeping machine picks up dirt and trash from paved street and deposits it in rear of machine.

4 **Manipulating:** Using body members, tools, or special devices to work, move, guide, or place objects or materials. Involves some latitude for judgment with regard to precision attained and/or selecting appropriate tools, object, or material, although this is readily manifest.

- Examples:

Shapes knitted garments after cleaning by shrinking or stretching garments by hand to conform to original measurements.

Trims and smooths edges, surfaces, and impressed or raised designs of jewelry articles and jewelry findings, using files, chisels, and saws.

Scrapes, files, and sands machine-shaped gunstocks to remove excess wood and impart finished appearance to surface, using files, sandpaper, and emery cloth.

Moves rotating disk of powered portable grinder against surface of stationary workpiece to remove scratches, excess weld material, and burrs. Changes disks to ones with progressively finer abrasives to obtain specified finish on workpiece.

Draws different color strips of material, such as fabric or leather, between slits in shoe upper to weave decorative design, according to specifications.

Turns sprayer valves and nozzle to regulate width and pressure of spray, pulls trigger, and directs spray onto work surface to apply prime or finish coat, according to knowledge of painting techniques.

Guides tip of soldering iron along seam of metal plates to heat plates to bonding temperature and dips bar or wire of soft solder in seam to solder joint.

Mixes soldering flux in crock or vat, according to formula, using paddle, and tests consistency of flux with hydrometer.

Repacks parachutes that have been opened in use, or unopened ones that are to be repacked in interest of safety.

Attaches cables to buildings, installs supports, and cuts or drills holes in walls and partitions through which cables are extended, using wrenches, pliers, screwdrivers, saws, and drills.

5 **Tending:** Starting, stopping, and observing the functioning of machines and equipment. Involves adjusting materials or controls of the machine, such as changing guides, adjusting timers and temperature gages, turning valves to allow flow of materials, and flipping switches in response to lights. Little judgment is involved in making these adjustments. Included are situations, as in Operating-Controlling, in which the worker can be considered an extension of the machine, either as the holder and guider of the material or holder and guider of the tool.

- Examples:

Positions and secures scoring disks on machine shaft, turns handwheel to adjust pressure on disks, and feeds cardboard blanks into machine hopper.

Turns controls to regulate amount of coal, pushes air-blower controls that blow coal into furnaces, and observes air gages and feed of coal.

Presses pedal or button, and moves lever on packaging machine. Observes operation to detect malfunctions. Opens valves, changes cutting dies, sets guides, and clears away damaged products or containers.

Holds and turns wood shoe last against revolving sanding wheel to remove specified amount of material and to smooth surface of last while retaining original contours. Verifies contours of sanded last, using template.

Lights fire and opens valves to regulate fuel supply to asphalt-heater. Screws hose connnections to heater to connect circulating system, and uses pump to circulate asphalt through heating unit. Observes temperature gage and adjusts blower and damper controls to regulate heat and maintain required temperature.

Adjusts control that regulates stroke of paper pusher on machine that assembles pages of printed material in numerical sequence. Places pages to be assembled in holding tray. Turns controls manually to start machine and removes assembled pages from machine.

Depresses pedal to start, stop, and control speed of yarn winding machine. Observes yarn to detect slubs and broken or tangled ends, cuts out slubs, using scissors, and ties broken yarn ends.

Positions spring on bed of machine, turns hand gages to regulate travel of flattening ram, and pulls lever to lower ram that compresses spring under specified pressure.

Places tack in holder on machine bed. Positions premarked article over tack on bed and positions button on garment over tack and under machine ram. Depresses pedal that lowers ram to join button to article.

Shovels coal or coke into firebox of boiler, turns valves to regulate flow of gas, oil, or pulverized coal into firebox, or moves controls to regulate feeding speed of automatic stoker. Reads gages and moves controls to maintain specified steam pressure, temperature, and water level in boiler.

6 **Feeding-Offbearing:** Inserting, throwing, dumping, or placing materials in or removing them from machines or equipment which are automatic or tended or operated by other workers.

- Examples:

Inserts milled rubber stock into rolls of calendering machine to maintain continuous supply.

Places molded lens blanks into automatic burr-grinding machine. Catches ejected blanks and stacks them in trays prior to polishing.

Removes cartons of bottles from conveyor and stacks them on pallet.

Picks up and dumps specified dry materials into feeder hopper of crutcher equipment which forms slurry for processing into soap.

Hangs toy parts in specified positions on hooks of overhead conveyor that passes through painting operations and lifts painted parts from hooks.

Places eggs in holder that carries them into machine that removes earth, straw, and other residue from egg surface prior to shipment. Removes cleaned eggs and packs them in cases.

Places plate glass onto conveyor of glass silvering machine or automatic washing and drying machines, and removes silvered or cleaned mirror from conveyor.

Shovels scrap tobacco onto screens of cleaning machine, picks out stems and dirt from tobacco, and shovels tobacco dust from receptacle under screen into containers.

Picks up handfuls of glass pipettes from conveyor and packs them into boxes.

Dumps dyed cotton fiber into hopper of extractor that removes liquid by forcing cotton through rollers.

Places soiled garments into washing machine, extractor, and tumbler, and removes garments at completion of cleaning cycle.

Removes stacks of paper cups accumulating at collection rack at end of pneumatic tube leading from automatic cup-forming machine, and packs cups into cardboard tubes.

7 **Handling:** Using body members, handtools, and/or special devices to work, move, or carry objects or materials. Involves little or no latitude for judgment with regard to attainment of standards or in selecting appropriate tool, object, or material.

- Examples:

Loads and pushes handtruck to move metal molds of pipemaking concrete from forming area to steam-cooking area.

Hammers steel pins into holes in ends of logs preparatory to skidding.

Drives herd of goats to fresh pastures during day and back to corral at night.

Files documents in alphabetical or numerical order, or according to subject matter, and removes documents from files upon request.

Clears stumps, trees, brush, cactus, mesquite, or other growth from land so land can be used as pasture, for cultivation, or for proposed construction project.

Weighs materials in chemical plant and writes or stencils identifying information on containers. Fastens caps or covers on containers, or screws bungs in place. Cleans stills and other equipment, using detergents. Loads railroad cars or trucks.

Distributes work cards containing instructions to workers.

Mops, sweeps, and dusts halls and corridors.

Digs ditches that drain excess moisture from land, using pick and shovel.

Transfers fingerprints from persons onto cards for purposes of identification.

Cuts candy into squares, using knife.

Folds and stacks cuffs preparatory to sewing cuffs to sleeves of garments.

Scrapes or knocks mortar from bricks, using hammer.

Copies production data, using pen.

CHAPTER 7

WORK FIELDS

Page

Combination Work Fields 121

Procedure for Assigning Work Fields 121

Alphabetical Listing of Work Fields 122

Work Fields Organization 123

Listing of Combination Work Fields 126

Work Fields Descriptions 127

CHAPTER 7

WORK FIELDS

Work fields are categories of technologies that reflect how work gets done and what gets done as a result of the work activities of a job —**the purpose of the job**. There are 94 work fields identified for use by the United States Employment Service for classification of all jobs in the economy in terms of what gets done on the job.

Work fields range from the specific to the general and are organized into homogeneous groups, based on related technologies or objectives, such as the movement of materials, the fabrication of products, the use of data, and the provision of services. Each work field is identified by a three-digit code, a brief descriptive title, and a definition. In many cases, a comment is included which enlarges upon the definition and limits or extends the application of the work field. Also, cross-references distinguishing the work field from other related work fields are frequently included.

Following the definition is a list of verbs (methods verbs) which illustrate the application of the work field. This list is not intended to be exhaustive, but merely representative of the ways in which the objective of the work field can be accomplished. Note that the methods verbs listed do not include those appearing in the title or definition for that work field.

Combination Work Fields

Combination work fields are general categories of work fields that contain combinations of three or more work fields to cover jobs involving various technologies. For example, Structural Fabricating-Installing-Repairing includes combinations of such specific work fields as Abrading, Nailing, Riveting, and Welding. When only one or two component work fields apply, assign only those specific work fields. A listing of combination work fields appears on pp. 126-127.

Procedure for Assigning Work Fields

Select one or more of the work fields that most adequately encompass what gets done. Work fields should not be assigned on the basis of minor activities, such as incidental material moving or recordkeeping.

- First-line supervisors are assigned the same work field(s) as the workers supervised, because they must have the same knowledge and abilities.
- For machine-related jobs, the work field(s) usually reflects what the machine does.

Alphabetical Listing of Work Fields

051	Abrading
291	Accommodating
295	Administering
298	Advising-Counseling
002	Animal Propagating
211	Appraising
262	Artistic Painting-Drawing
141	Baking-Drying
071	Bolting-Screwing
053	Boring
153	Brushing-Spraying
034	Butchering-Meat Cutting
094	Calking
132	Casting
052	Chipping
031	Cleaning
161	Combing-Napping
263	Composing-Choreographing
146	Cooking-Food Preparing
142	Crushing-Grinding
233	Data Processing
135	Die Sizing
202	Developing-Printing
144	Distilling
242	Drafting
• 111	Electrical-Electronic Fabricating-Installing-Repairing
154	Electroplating
244	Engineerng
183	Engraving
297	Entertaining
182	Etching
007	Excavating-Clearing-Foundation Building
062	Fastening
041	Filling-Packing-Wrapping
061	Fitting-Folding
082	Flame Cutting-Arc Cutting-Beam Cutting
063	Gluing-Laminating
294	Health Caring-Medical
133	Heat Conditioning
001	Hunting-Fishing
151	Immersing-Coating
192	Imprinting
282	Information Giving
212	Inspecting-Measuring-Testing
271	Investigating
165	Knitting
092	Laying-Covering
241	Laying Out
272	Litigating
033	Lubricating
• 057	Machining
091	Masoning
011	Material Moving
• 121	Mechanical Fabricating-Installing-Repairing
131	Melting
292	Merchandising-Sales
055	Milling-Turning-Planing
004	Mining-Quarrying-Earth Boring
143	Mixing
136	Molding
072	Nailing
232	Numerical Recording-Recordkeeping
095	Paving
201	Photographing
003	Plant Cultivating
134	Pressing-Forging
191	Printing
• 147	Processing-Compounding
293	Protecting
014	Pumping
251	Researching
073	Riveting
152	Saturating
056	Sawing
145	Separating
171	Sewing-Tailoring
054	Shearing-Shaving
083	Soldering-Brazing
162	Spinning
021	Stationary Engineering
221	Stock Checking
• 102	Structural Fabricating-Installing-Repairing
264	Styling
032	Surface Finishing
243	Surveying
281	System Communicating
296	Teaching
013	Transporting
166	Tufting
231	Verbal Recording-Recordkeeping
164	Weaving
081	Welding
163	Winding
261	Writing

•Combination Work Fields

Work Fields Organization

The work fields have been organized into the following groups on the basis of similar technologies. This arrangement may be helpful in insuring the applicability of the work field(s) selected for the job being analyzed.

ORGANIZATION	DESCRIPTION
001 HUNTING-FISHING 002 ANIMAL PROPAGATING 003 PLANT CULTIVATING 004 MINING-QUARRYING-EARTH BORING	Securing, producing, and cultivating raw materials, products, and animals (livestock or game) on and below the surface of the earth; usually outdoor work.
007 EXCAVATING-CLEARING-FOUNDATION BUILDING	Grading surfaces and building foundations.
011 MATERIAL MOVING 013 TRANSPORTING 014 PUMPING	Moving materials and people by hand and machine power.
021 STATIONARY ENGINEERING	Producing and distributing heat, power, and conditioned air.
031 CLEANING	Industrial, commercial, and domestic cleaning.
032 SURFACE FINISHING	Shaping, pressing, and stretching articles, usually with heat and steam, under tension or pressure.
033 LUBRICATING	Coating objects with liquid and dry lubricants.
034 BUTCHERING-MEAT CUTTING	Slaughtering livestock and preparing meats for marketing.
041 FILLING-PACKING-WRAPPING	Packaging materials and products for distribution and storage.
051 ABRADING 052 CHIPPING 053 BORING 054 SHEARING-SHAVING 055 MILLING-TURNING-PLANING 056 SAWING 057 MACHINING	Working with machines and handtools to cut and shape materials and objects usually made from wood, metal, and plastics. Can also involve assembly of objects.

061	FITTING-FOLDING	Folding and assembling parts and materials, usually light, by means of fitting together or joining with sticky compounds and fastening devices, such as staples, grommets, and snaps.
062	FASTENING	
063	GLUING-LAMINATING	
071	BOLTING-SCREWING	Assembling parts and materials, usually of metal, wood, and plastics, by means of screws, nails, and rivets.
072	NAILING	
073	RIVETING	
081	WELDING	Bonding and cutting materials by means of a gas flame, electric arc, laser beam, combination welding process, and soldering.
082	FLAME CUTTING-ARC CUTTING-BEAM CUTTING	
083	SOLDERING-BRAZING	
091	MASONING	Building and repairing structures and surfaces, and assembling structural parts, usually working with brick, cement, mortar, stone, and other building materials.
092	LAYING-COVERING	
094	CALKING	
095	PAVING	
102	STRUCTURAL FABRICATING-INSTALLING-REPAIRING	All-round fabricating, installing, and repairing of structures and electrical, electronic, and mechanical units.
111	ELECTRICAL-ELECTRONIC FABRICATING-INSTALLING-REPAIRING	
121	MECHANICAL FABRICATING-INSTALLING-REPAIRING	
131	MELTING	Compounding, melting, heat conditioning, and shaping objects, usually metal and plastics, by methods which frequently involve heat.
132	CASTING	
133	HEAT CONDITIONING	
134	PRESSING-FORGING	
135	DIE SIZING	
136	MOLDING	
141	BAKING-DRYING	Processing various materials, in solid, fluid, semi-fluid, and gaseous states, during production process.
142	CRUSHING-GRINDING	
143	MIXING	
144	DISTILLING	
145	SEPARATING	
146	COOKING-FOOD PREPARING	
147	PROCESSING-COMPOUNDING	
151	IMMERSING-COATING	Coating and impregnating materials and products to impart decorative and protective finish and other specific qualities.
152	SATURATING	
153	BRUSHING-SPRAYING	
154	ELECTROPLATING	

161	COMBING-NAPPING	Converting fiber raw stock into yarn and thread, and interlacing and otherwise working yarns to form woven, nonwoven, knitted, and tufted fabrics.
162	SPINNING	
163	WINDING	
164	WEAVING	
165	KNITTING	
166	TUFTING	
171	SEWING-TAILORING	Joining, mending, and fastening materials, usually with needle and thread, and fitting and adjusting parts.
182	ETCHING	Cutting designs and letters into materials and products by sandblasting (Abrading), applying acids (Etching), and action of sharp pointed tools (Engraving).
183	ENGRAVING	
191	PRINTING	Transferring letters and designs onto paper and other material, by use of ink and pressure, includes setting type and preparing plates.
192	IMPRINTING	
201	PHOTOGRAPHING	Taking pictures and processing film.
202	DEVELOPING-PRINTING	
211	APPRAISING	Evaluating and estimating the quality, quantity, and value of things and data; ascertaining the physical characteristics of materials and objects.
212	INSPECTING-MEASURING-TESTING	
221	STOCK CHECKING	Receiving, storing, issuing, shipping, requisitioning, and accounting for stores of materials.
231	VERBAL RECORDING-RECORDKEEPING	Preparing and maintaining verbal and numerical records.
232	NUMERICAL RECORDING-RECORDKEEPING	
233	DATA PROCESSING	
241	LAYING OUT	Plotting, tracing, and drawing diagrams and other directive graphic information for use in design and production; designing and constructing machinery, structures, and systems.
242	DRAFTING	
243	SURVEYING	
244	ENGINEERING	
251	RESEARCHING	Controlled exploration of fundamental areas of knowledge, by means of critical and exhaustive investigation and experimentation.

261	WRITING	Creative work.
262	ARTISTIC PAINTING-DRAWING	
263	COMPOSING-CHOREOGRAPHING	
264	STYLING	
271	INVESTIGATING	Dealing with people to gather information to carry out business and legal procedures.
272	LITIGATING	
281	SYSTEM COMMUNICATING	Providing and effecting the transmission of information to other persons, indirectly (by electrical or electronic media) and directly (by voice or written statement).
282	INFORMATION GIVING	
291	ACCOMMODATING	Dealing with people to provide services of various types.
292	MERCHANDISING-SALES	
293	PROTECTING	
294	HEALTH CARING-MEDICAL	
295	ADMINISTERING	
296	TEACHING	
297	ENTERTAINING	
298	ADVISING-COUNSELING	

Listing of Combination Work Fields

The following is a listing of combination work fields and the corresponding component work fields of which they are comprised.

COMBINATION WORK FIELDS	COMPONENT WORK FIELDS
057 MACHINING	Abrading (051), Boring (053), Chipping (052), Milling-Turning-Planing (055), Sawing (056), and Shearing-Shaving (054).
102 STRUCTURAL FABRICATING-INSTALLING-REPAIRING	Abrading (051), Bolting-Screwing (071), Boring (053), Brushing-Spraying (153), Calking (094), Chipping (052), Fastening (062), Fitting-Folding (061), Flame Cutting-Arc Cutting-Beam Cutting (082), Gluing-Laminating (063), Immersing-Coating (151), Laying-Covering (092), Masoning (091), Milling-Turning-Planing (055), Molding (136), Nailing (072), Paving (095), Pressing-Forging (134), Riveting (073), Sawing (056), Sewing-Tailoring (171), Shearing-Shaving (054), Soldering-Brazing (083), and Welding (081).

111	ELECTRICAL-ELECTRONIC FABRICATING-INSTALLING-REPAIRING	Abrading (051), Bolting-Screwing (071), Boring (053), Fitting-Folding (061), Nailing (072), Riveting (073), Soldering-Brazing (083), Welding (081), and Winding (163).
121	MECHANICAL FABRICATING-INSTALLING-REPAIRING	Abrading (051), Bolting-Screwing (071), Boring (053), Brushing-Spraying (153), Chipping (052), Fastening (062), Fitting-Folding (061), Flame Cutting-Arc Cutting-Beam Cutting (082), Gluing-Laminating (063), Immersing-Coating (151), Milling-Turning-Planing (055), Nailing (072), Pressing-Forging (134), Riveting (073), Sawing (056), Sewing-Tailoring (171), Shearing-Shaving (054), Soldering-Brazing (083), and Welding (081).
147	PROCESSING-COMPOUNDING	Baking-Drying (141), Distilling (144), Heat Conditioning (133), Melting (131), Mixing (143), Saturating (152), and Separating (145).

Work Fields Descriptions

001 HUNTING-FISHING

Capturing and killing wild land and marine animals for such purposes as bounty, conservation, research, and for their value as meat or skin.

METHODS VERBS

Baiting
Dipping
Dragging
Dredging
Hooking
Raking
Seining
Shooting
Spearing
Tonging
Trapping
Trawling

Typical Occupations: Fisher, Trapper, Dredger, Fishing-Boat Captain, Deckhand.

002 ANIMAL PROPAGATING

Raising and caring for livestock, poultry, fish, and other animal life and collecting eggs, milk, wool, honey, and other animal products by methods which may include those specific to other work fields.

METHODS VERBS

- Bailing
- Branding
- Candling
- Caponizing
- Castrating
- Debeaking
- Dehorning
- Disinfecting
- Dredging (shellfish)
- Feeding
- Fumigating
- Grooming
- Hatching
- Herding
- Incubating
- Inseminating
- Milking
- Milting
- Netting
- Pelting (mink)
- Rounding up
- Separating
- Sexing (poultry)
- Shearing (sheep)
- Shoeing (horses)
- Skinning
- Sowing
- Spawning
- Sterilizing
- Training
- Washing (eggs)
- Watering
- Vaccinating

Typical Occupations: Animal Breader, Dairy Farmer, Poultry-Farm Worker, Beekeeper, Artificial Inseminator, Milker, Animal Herder.

003 PLANT CULTIVATING

Planting, nurturing, harvesting, and otherwise caring for agricultural and forest plant life by methods which may include those specific to other work fields.

METHODS VERBS

- Bailing
- Bucking (logs)
- Budding
- Conditioning (soil)
- Cruising
- Culling
- Curing (tobacco)
- Cutting
- Detasseling
- Digging
- Disking
- Drying
- Dusting
- Felling (timber)
- Fertilizing
- Gathering
- Grading
- Grafting
- Harrowing
- Hoeing
- Husking
- Irrigating
- Logging
- Mowing
- Mulching
- Picking
- Plowing
- Potting
- Propagating
- Pruning
- Rafting
- Raking
- Reaping
- Riving
- Shelling
- Sorting
- Sowing
- Spading
- Splitting (logs)
- Spraying
- Stringing
- Thinning
- Threshing
- Tilling
- Transplanting
- Watering
- Weeding
- Winnowing

Typical Occupations: Farm-Equipment Operator, Landscaper, Gardener, Logger, Crop Farmer, Farm Hand, Harvest Worker, Nursery Worker.

004 MINING-QUARRYING-EARTH BORING

Extracting minerals, oil, gas, water, and stone from the earth. Includes drilling earth formations to obtain core samples.

METHODS VERBS

- Blasting
- Breaking
- Chipping
- Crushing
- Digging
- Panning
- Perforating

Typical Occupations: Miner, Driller, Blaster, Quarry Supervisor, Mine Supervisor, Well Driller, Quarry Worker, Prospector.

007 EXCAVATING-CLEARING-FOUNDATION BUILDING

Removing and distributing earth materials, such as dirt, gravel, rock, and sand; grading surfaces; dredging ditches, canals, and marine channels; drilling holes in earth and through rock formations for purposes other than blasting and mineral extractions; and driving pilings and shafts into earth for structural footings. Includes clearing away obstacles preparatory to construction and logging, and controlling growth of weeds, trees, bushes, etc., to facilitate maintenance of utility lines and rights-of-way.

METHODS VERBS

Backfilling
Burning
Cutting
Digging
Raking
Trimming

Typical Occupations: Tree Trimmer, Pile-Driver Operator, Dredge Operator, Dredging Inspector, Brush Clearer, Grade Operator, Levee Superintendent, Pile-Driving Supervisor, Motor Grader, Bulldozer Operator.

011 MATERIAL MOVING

Conveying materials manually and by use of machines and equipment, such as cranes, hoists, conveyors, industrial trucks, elevators, winches, and handtrucks. Distinguish from Transporting (013), which involves conveyance of passengers and materials by common carrier.

METHODS VERBS

Carrying
Dragging
Drawing
Dumping
Floating
Forking
Hanging
Hoisting
Lifting
Loading
Relaying
Shackling
Shoveling
Skidding
Throwing
Unloading
Wheeling

Typical Occupations: Fork-Lift Operator, Crane Operator, Stevedore, Freight-Elevator Operator, Hoist Operator, Conveyor Worker.

013 TRANSPORTING

Conveying passengers and materials by truck, bus, airplane, train, ship, automobile, and other vehicles. Distinguish from Material Moving (011), which involves moving materials by conveyances other than common carriers.

METHODS VERBS

Driving
Flying
Landing
Piloting
Steering
Stoking
Taking Off

Typical Occupations: Vehicle Driver, Airplane Pilot, Marine-Vessel Captain, Locomotive Engineer.

014 PUMPING

Raising, lowering, and moving gases, liquids, and solids by suction, pressure, and vacuum within a piping system.

METHODS VERBS

Draining
Drawing (off or out)
Expelling
Propelling
Siphoning
Sucking

Typical Occupations: Pump Operator-Gager, Terminal Supervisor, Oil Dispatcher.

021 STATIONARY ENGINEERING

Producing and distributing heat, power, and conditioned air.

METHODS VERBS

Compressing (air)
Cooling
Firing
Generating
Humidifying
Purifying
Refrigerating
Ventilating

Typical Occupations: Boiler Operator, Stationary Engineer, Compressor Operator, Powerhouse Attendant, Power Dispatcher.

031 CLEANING

Cleaning objects and premises by methods such as washing with water, steam, and cleaning agents; brushing, wiping, sweeping, raking, and scraping; using suction, compressed air, and ultrasonic equipment.

METHODS VERBS

Agitating
Beating
Blowing
Chipping
Dusting
Filtering
Fluffing
Flushing
Hosing
Immersing
Mopping
Scalding
Scrubbing
Shaking
Shoveling
Soaking
Sopping
Sponging
Spotting
Steaming
Straining
Tumbling

Typical Occupations: Laundry Worker, Dishwasher, Equipment Cleaner, Janitor, Housekeeper, Cleaning Supervisor.

032 SURFACE FINISHING

Removing wrinkles from, restoring shape to, and giving finish to articles made of fabric, fur, leather, straw, paper, and similar materials by application of tension and pressure (usually accompanied by heat or steam). Includes burning excess materials from surfaces of articles.

METHODS VERBS

Blocking (hats)
Brushing
Calendering
Gassing
Ironing
Pressing
Rubbing
Singeing
Steaming
Stretching
Texturing

Typical Occupations: Ironer, Presser (Hand and Machine), Hat Blocker, Tenter-Frame Operator, Singeing-Machine Operator, Calender-Machine Operator.

033 LUBRICATING

Coating objects with lubricants to reduce friction of moving parts and to prevent sticking.

METHODS VERBS

Dusting
Graphiting
Greasing
Oiling
Spraying
Swabbing
Waxing

Typical Occupations: Oiler, Greaser, Automobile Lubricator.

034 BUTCHERING-MEAT CUTTING

Killing and cutting up animals, poultry, finfish, and shellfish, and dressing and processing meats for marketing.

METHODS VERBS

Boning
Bleeding
Cleaving
Eviscerating
Flushing
Gutting
Plucking
Sawing
Scraping
Shackling
Shaving
Skinning
Singeing
Striking
Stripping
Trimming

Typical Occupations: Butcher, Meat Cutter, Poultry Worker, Slaughterhouse Worker, Hide Puller; Dehairing-Machine Operator, Fish Cleaner.

041 FILLING-PACKING-WRAPPING

Pouring dry and liquid materials and products into containers; enveloping and enclosing materials and products in paper, cellophane, burlap, and other materials; putting materials and products into containers; and closing and sealing containers. Includes unpacking, unwrapping, and refilling.

METHODS VERBS

Banding
Boxing
Bunching
Channeling
Covering
Draping
Dropping
Dumping
Folding
Funneling
Injecting
Inserting
Moistening
Padding
Peeling Off
Securing
Spooning
Stacking
Strapping
Stripping
Twisting
Typing

Typical Occupations: Packager, Filling-Machine Operator, Baling-Machine Operator, Wrapping-Machine Operator, Packaging Supervisor, Bagger.

051 ABRADING

Smoothing, polishing, and sharpening materials; and cutting letters and designs into objects and structures by the wearing-away action of abrasives. Distinguish from Cleaning (031), in which abrasives may be used to remove foreign substances.

METHODS VERBS

Blowing
Buffing
Filing
Finishing
Frosting
Grinding
Honing
Lapping
Pouncing
Rubbing
Sandblasting
Sanding
Sandpapering
Scraping

Typical Occupations: Sandblaster, Grinder, Polisher, Honer, Glass Beveler, Tumbling-Machine Operator, Bit Sharpener, Sander.

052 CHIPPING

Cutting away flakes and fragments with hatchets and chisels struck with hammers or similarly activated by compressed air. Distinguish from Milling-Turning-Planing (055), in which rotary or chisel-like cutters are used but without percussion.

METHODS VERBS

Breaking Up
Broaching
Chiseling
Chopping
Gouging
Hewing
Striking
Wedging

Typical Occupations: Chiseler, Chipper, Air-Hammer Operator.

053 BORING

Making, enlarging, and threading holes in material (other than earth) by means of rotary cutting tools advanced into the material. Distinguish from piercing by Pressing-Forging (134), in which tools do not rotate.

METHODS VERBS

- Countersinking
- Drilling
- Piercing
- Reaming
- Tapping

Typical Occupations: Boring-Machine Operator, Drill-Press Operator, Reaming-Machine Tender, Countersinker, Driller.

054 SHEARING-SHAVING

Cutting, severing, slicing, and shaving materials, using keen-edged cutting tools. Includes cutting glass, plastics, and other materials with heated wires. Distinguish from Sawing (056), which involves use of serrated tools to cut materials by wearing out a kerf.

METHODS VERBS

- Clipping
- Die Cutting
- Snipping
- Trimming

Typical Occupations: Hot-Wire Cutter, Die Cutter, Fabric Cutter, Fabric Trimmer, Slitting-Machine Operator, Shearing-Machine Operator, Cutting-Department Supervisor, Book Trimmer, Shoe-Parts Cutter, Plastic-Material Cutter, Skiving-Machine Operator.

055 MILLING-TURNING-PLANING

Shaping materials by the paring and smoothing action of rigid cutting tools (usually fed into rotating materials) and rotating cutting tools (usually fed into stationary materials). Distinguish from Chipping (052), in which the cutting away of flakes and fragments is accomplished by chisel-like tools actuated by a percussive power source.

METHODS VERBS

- Broaching
- Dadoing
- Gaining
- Grooving
- Mortising
- Profiling
- Rabbeting
- Routing
- Scarfing
- Shaving
- Tonguing
- Undercutting

Typical Occupations: Lathe Operator, Milling-Machine Operator, Machine Setter, Wood-Carving-Machine Operator, Tooth Cutter, Gear Cutter, Screw-Machine Operator.

056 SAWING

Severing and shaping materials by the reciprocal or rotary cutting action of a blade which wears out a kerf. The blade may be serrated or be made of, or coated with, abrasives. Excluded from this work field is the felling of trees, which is covered by Plant Cultivating (003). Distinguish from Shearing-Shaving (054), which includes a severing function but without wearing out a kerf.

METHODS VERBS

Crosscutting
Dadoing
Gaining
Grooving
Mitering
Ripsawing
Tenoning

Typical Occupations: Cut-Off-Saw Operator, Band-Saw Operator, Gang Sawyer, Kerf-Machine Operator, Last Trimmer.

057 MACHINING

Shaping parts by three or more of the following work fields: Abrading (051), Boring (053), Chipping (052), Milling-Turning-Planing (055), Sawing (056), and Shearing-Shaving (054). Jobs involved with only one or two of these work fields are to be assigned those work fields only.

METHODS VERBS

Forming

Typical Occupations: Shop Machinist, Tool-and-Die Maker, Shop Supervisor, Job Setter.

061 FITTING-FOLDING

Folding, joining, and fitting parts without the use of bolts, screws, nails, rivets, solder, welding equipment, and glue. This work field includes such job activities as interlacing and joining parts, such as boards and precut and fabricated wood or metal units; fitting together parts of shoes; putting coils and insulation into frames to form stators; assembling parts of mechanical pencils; pressing bushings into bearing housings; and putting together pins and buttons to form campaign badges. Distinguish from Fastening (062), which involves joining materials by fastening with staples, eyelets, grommets, and snaps.

METHODS VERBS

Bending
Bracing
Clamping
Clinching
Creasing
Crimping
Hammering
Hanging
Inlaying
Inserting
Interweaving
Inverting
Jamming
Looping
Packing
Pulling
Pushing
Shoving
Sliding
Slipping
Splicing
Springing
Squeezing
Tapping
Threading
Tightening
Twisting
Wedging

Typical Occupations: Pen Assembler, Folder, Stringer, Basket Maker, Clock-and-Watch Parts Assembler, Pleater.

062 FASTENING

Joining light material (such as paper, cardboard, and fabrics) with fasteners, such as staples, eyelets, grommets, and snaps. Assignment is not made when the joining of materials involves methods applicable to other work fields, such as Bolting-Screwing (071), Fitting-Folding (061), Gluing-Laminating (063), Nailing (072), Riveting (073), Soldering-Brazing (083), and Welding (081).

METHODS VERBS

Clinching
Compressing
Creasing
Crimping
Hammering
Hanging
Inlaying
Inserting
Inverting
Jamming
Looping
Pressing
Pulling
Pushing
Shoving
Sliding
Slipping
Splicing
Springing
Squeezing
Tapping
Threading
Tightening
Twisting
Wedging

Typical Occupations: Stitching-Machine Operator, Stapler, Eyelet-Machine Operator, Wreath Maker.

063 GLUING-LAMINATING

Fastening together parts with sticky substances, such as cement, glue, paste, gum, and other adhesive media. Includes bonding of parts by application of heat and pressure.

METHODS VERBS

Brushing
Clamping
Compressing
Daubing
Fusing
Moistening
Pressing
Rolling
Spreading
Stretching
Wetting

Typical Occupations: Cementer, Glue-Machine Operator, Combining-Machine Operator, Bonding-Machine Operator, Cloth Laminator, Hot-Press Worker, Heat-Sealing-Machine Operator.

071 BOLTING-SCREWING

Fastening together parts with threaded bolts and screws fitted through adjoining holes previously bored and threaded, or by forcing threaded screws through parts. In some instances, holes may be partially bored but not prethreaded to accommodate screws, or bolts may be secured in place by inserting them in threaded nuts. Distinguish from Riveting (073), which involves the use of nonthreaded bolts to fasten parts.

METHODS VERBS

Tapping
Threading
Tightening
Twisting

Typical Occupations: Clock-and-Watch-Parts Assembler, Power-Tool Operator, Vehicle-Light Assembler, Screw Remover, Wooden-Heel Attacher, Spring Assembler.

072 NAILING

Fastening together parts with devices, such as nails, tacks, spikes, brads, and staples. Distinguish from Riveting (073), in which a nonthreaded fastening device is secured by hammering and pressing to spread protruding shank ends. Distinguish from Fastening (062), where light materials are joined.

METHODS VERBS

Driving (nails)
Hammering
Stapling
Striking
Tacking

Typical Occupations: Nailer, Shoe-Parts Assembler, Stapler, Tack Puller, Tacker.

073 RIVETING

Fastening parts with headed, malleable bolts, pins, and rods fitted through previously bored holes, and hammering and pressing shank ends. Distinguish from Fastening (062), which involves joining light materials.

METHODS VERBS

Bucking
Clinching
Dimpling
Driving
Hammering
Peening
Squeezing
Striking

Typical Occupations: Riveter, Riveting Inspector.

081 WELDING

Joining metal, glass, and plastic parts by heating surfaces to induce fusion with or without the application of filler materials and pressure. Forge-welding, which involves applying sharp blows, is covered by Pressing-Forging (134). Distinguish from Flame Cutting-Arc Cutting-Beam Cutting (082), in which similar equipment is used to sever parts, and from Soldering-Brazing (083), which involves joining parts by the adhesion of solder.

METHODS VERBS

Burning
Fusing
Melting
Puddling
Stirring

Typical Occupations: Welder, Welding Supervisor, Welding Inspector, Lead Burner.

082 FLAME CUTTING-ARC CUTTING-BEAM CUTTING

Severing materials by subjecting materials to intense heat, using equipment, such as oxyacetylene torches, electric-arc cutting equipment, and laser beams. Distinguish from Welding (081), which may use the same equipment but for the purpose of joining materials. Cutting by use of hot-wire is included in Shearing-Shaving (054).

METHODS VERBS

Burning
Scarfing
Scraping

Typical Occupations: Flame Cutter, Scrap Burner, Scarfing Operator, Laser-Beam Cutter.

083 SOLDERING-BRAZING

Joining metal parts or filling depressions in metal with molten solder or brazing alloy. Distinguish from Welding (081), in which parts are joined by fusion under heat.

METHODS VERBS

Dipping
Heating
Melting
Rubbing
Smoothing
Spreading
Sweating

Typical Occupations: Brazer, Solderer, Furnace Operator, Brazing Assembler.

091 MASONING

Constructing structures of brick, stone, marble, and similar building materials, usually set in beds of mortar; and spreading and smoothing plaster, mortar, stucco, and similar materials to form and cover structural elements. Distinguish from Laying-Covering (092), in which materials are fastened to surfaces as finish and insulating coverings.

METHODS VERBS

Bricking
Brushing
Finishing
Floating
Imbedding
Patching
Pointing
Pressing
Rubbing
Scraping
Setting
Spattering
Tamping
Tapping
Tearing Out
Wetting

Typical Occupations: Mason, Plasterer, Plastering Supervisor, Concrete Finisher.

092 LAYING-COVERING

Covering the surface of structural units, such as roofs, floors, pipes, ductwork, tanks, boilers, and refrigeration and air-conditioning equipment, and of objects with materials in the form of sheets, blocks, tile, and rolled goods (including insulation bats). Distinguish from Masoning (091), which involves constructing as well as covering structural units; from Gluing-Laminating (063), which involves fastening parts together to assemble rather than cover; and from Calking (094), which includes filling spaces with loose insulating materials.

METHODS VERBS

Cementing
Gluing
Inlaying
Matching
Pasting
Patching
Pointing
Pressing
Rolling
Smoothing
Spreading
Stapling
Tamping
Tapping
Tying
Wrapping

Typical Occupations: Floor Layer, Carpet Layer, Roofer, Insulation Worker, Pipe Coverer, Siding Installer.

094 CALKING

Sealing and filling holes, crevices, cracks, joints, seams, depressions, and other spaces with a material (other than solder) for such purposes as making object or structure airtight, waterproof, and weatherproof. Includes the blowing of loose insulation materials into open spaces, but not the laying of insulation material as a cover, which is included in Laying-Covering (092).

METHODS VERBS

Blowing (loose insulating materials)
Hammering
Puttying
Ramming
Scraping
Smoothing

Typical Occupations: Putty Spreader, Calker, Hole Filler, Insulation Blower, Plywood-Panel Sealer, Barrel Liner.

095 PAVING

Covering surfaces with materials, such as asphalt, concrete, tar, oil, and gravel.

METHODS VERBS

Compacting
Filling
Leveling
Oiling
Patching
Rolling
Scraping
Smoothing
Spreading
Tamping

Typical Occupations: Paving-Machine Operator, Spreader Operator, Curbing-Machine Operator, Paving Supervisor, Sprayer Operator.

102 STRUCTURAL FABRICATING-INSTALLING-REPAIRING

Fabricating, installing, and repairing structures and objects whose components are static and may require shaping to fit by three or more of the following work fields: Abrading (051), Bolting-Screwing (071), Boring (053), Brushing-Spraying (153), Calking (094), Chipping (052), Fastening (062), Fitting-Folding (061), Flame Cutting-Arc Cutting-Beam Cutting (082), Gluing-Laminating (063), Immersing-Coating (151), Laying-Covering (092), Masoning (091), Milling-Turning-Planing (055), Molding (136), Nailing (072), Paving (095), Pressing-Forging (134), Riveting (073), Sawing (056), Sewing-Tailoring (171), Shearing-Shaving (054), Soldering-Brazing (083), and Welding (081). Jobs involved with only one or two of these work fields are to be assigned those work fields only. Distinguish from Mechanical Fabricating-Installing-Repairing (121), and Machining (057).

METHODS VERBS

Alining
Anchoring
Blocking Up
Bracing
Cementing
Clamping
Clinching
Coupling
Glazing
Knocking Down
Leveling
Lining Up
Measuring
Padding
Plumbing
Positioning
Prying
Rigging
Sinking
Splicing
Staying
Truing

Typical Occupations: Construction Inspector, Carpenter, Boat Builder and Repairer, Boilermaker, Musical-Instrument Maker, Cabinetmaker, Cooper, Aircraft Assembler, Structural-Steel Erector, Pipefitter, Plumber, Propmaker, Upholsterer.

111 ELECTRICAL-ELECTRONIC FABRICATING-INSTALLING-REPAIRING

Fabricating, installing, and repairing objects that have electrical and electronic functioning elements by three or more of the following work fields: Abrading (051), Bolting-Screwing (071), Boring (053), Fitting-Folding (061), Nailing (072), Riveting (073), Soldering-Brazing (083), Welding (081), and Winding (163). Jobs involved with only one or two of these work fields are to be assigned those work fields only. Distinguish from Structural Fabricating-Installing-Repairing (102) and Mechanical Fabricating-Installing-Repairing (121).

METHODS VERBS

Calibrating
Connecting
Hooking Up
Plugging In
Stringing
Switching
Testing
Threading
Turning
Twisting
Wiring

Typical Occupations: Electrician, Instrument Mechanic, Appliance Assembler, Electronics Tester, Electrical-Equipment Installer, Electrical-Systems Installer and Repairer, Telephone-and-Telegraph Equipment Installer and Repairer.

121 MECHANICAL FABRICATING-INSTALLING-REPAIRING

Fabricating, installing, and repairing objects that have moving parts of mechanically functioning elements by three or more of the following work fields: Abrading (051), Bolting-Screwing (071), Boring (053), Brushing-Spraying (153), Chipping (052), Fastening (062), Fitting-Folding (061), Flame Cutting-Arc Cutting-Beam Cutting (082), Gluing-Laminating (063), Immersing-Coating (151), Milling-Turning-Planing (055), Nailing (072), Pressing-Forging (134), Riveting (073), Sawing (056), Sewing-Tailoring (171), Shearing-Shaving (054), Soldering-Brazing (083), and Welding (081). Jobs involved with only one or two of these work fields are to be assigned those work fields only. Distinguish from Structural Fabricating-Installing-Repairing (102) and Electrical-Electronic Fabricating-Installing-Repairing (111).

METHODS VERBS

Alining
Calibrating

Typical Occupations: Machinist, Tool-and-Die Maker, Automobile Mechanic, Air-Conditioning Mechanic, Gunsmith, Maintenance Mechanic, Watch Repairer.

131 MELTING

Changing materials from solid to liquid state (usually by heat) for such purposes as compounding with other materials, refining by separation (through accompanying chemical change), and making materials amenable to shaping and casting. Distinguish from Soldering-Brazing (083), and Welding (081), in which melting occurs incidental to joining parts together.

METHODS VERBS

Agitating
Charting
Drawing
Dumping
Filling
Firing
Fluxing
Fueling
Heating
Kindling
Loading
Pouring
Shoveling
Skimming
Stirring
Tapping
Throwing

Typical Occupations: Foundry Supervisor, Open-Hearth-Furnace Operator, Blast-Furnace Supervisor.

132 CASTING

Shaping materials by pouring, injecting, and pressing into a mold and permitting or causing to solidify. Distinguish from Die Sizing (135), in which shaping is effected by dies and rollers, Molding (136), in which shaping is dependent on worker, and Pressing-Forging (134), which involves application of force or sharp blows to accomplish shaping.

METHODS VERBS

Blowing
Brushing
Filling
Flooding
Inflating
Kneading
Placing (in mold)
Stretching
Throwing (in mold)

Typical Occupations: Die-Casting-Machine Operator, Coremaker, Bowling-Ball Molder, Injection-Molding-Machine Tender.

133 HEAT CONDITIONING

Hardening, softening, and toughening materials by heating and cooling with or without accompanying chemical change. Materials may be subjected to heat alone to alter molecular structure of materials and induce special qualities, such as hardness, flexibility, and ductility; or material may be treated with heat aided by carbonizing materials and chemical baths to impart a hard "skin" to the material. Included also is the activity in which materials are heated to treat them for further processing (e.g., bringing metal bars to prescribed red-hot temperature).

METHODS VERBS

Annealing
Bluing
Drawing
Freezing
Immersing
Packing
Plunging
Quenching
Refrigerating

Typical Occupations: Heat-Treat Supervisor, Annealer, Glass Bender, Rivet Heater.

134 PRESSING-FORGING

Shaping, severing, piercing, and forge-welding materials by a force pushed against or through materials, and/or by applying sharp blows (as in hammering). Distinguish from Casting (132), in which molds are used to shape material; Die Sizing (135), which utilizes dies and rollers in shaping; Surface Finishing (032), which is predominatly fabric oriented; and Molding (136), which involves the cumulative addition of material to original mass (by worker) in accomplishing shaping of material.

METHODS VERBS

Beating
Braking
Clipping
Coiling
Compressing
Crawing
Crimping
Dimpling
Dishing
Flaring
Hitting
Kneading
Molding
Pounding
Rolling
Shearing
Spinning
Stamping
Striking
Swaging
Twisting

Typical Occupations: Blacksmith, Forge-Shop Supervisor, Punch-Press Operator, Hammersmith.

135 DIE SIZING

Shaping material by forcing it through dies, drawing it through dies, and reducing it between rollers. Distinguish from Casting (132), in which shaping is achieved by use of molds; Surface Finishing (032), which is fabric oriented; Molding (136), which involves a cumulative buildup (by worker) in shaping materials; and Pressing-Forging (134), in which force or sharp blows are applied.

METHODS VERBS

Compressing
Extruding
Measuring
Pouring
Pressing
Pulling
Ramming
Rollforging
Rolling
Squeezing
Stamping
Straining

Typical Occupations: Chalk-Extruding-Machine Operator, Cold-Rolling Supervisor, Extrusion Supervisor.

136 MOLDING

Shaping material by cumulative addition of material (by worker) to build up original mass and pressing material into shape. Includes removing excess material to obtain finished product. Distinguish from Casting (132), in which shaping is primarily dependent on molds to shape material; Die Sizing (135), which utilizes dies or rollers to accomplish shaping; and Pressing-Forging (134), which involves applying a force or sharp blows to shape material.

METHODS VERBS

Compacting
Forming
Jolting
Kneading
Laying
Moistening
Packing
Padding
Rolling
Smearing
Smoothing
Softening
Spreading
Stuffing
Tamping
Vulcanizing

Typical Occupations: Concrete Sculptor, Cigarmaker, Candlemaker, Artificial-Plastic-Eye Maker, Vulcanizer.

141 BAKING-DRYING

Drying, solidifying, tenderizing, and otherwise subjecting materials to heat. Distinguish from Distilling (144), in which heating results in the refinement, concentration, and condensation of substances, gases, and vapors; and from Heat Conditioning (133), in which treatment of materials with heat induces special qualities, such as hardness, flexibility, and ductility.

METHODS VERBS

Burning
Curing
Dehydrating
Firing
Fluffing
Roasting
Seasoning (lumber)
Smoking
Tumbling

Typical Occupations: Fish Smoker, Cocoa-Bean Roaster, Tobacco Curer, Veneer-Drier Supervisor, Kiln Firer.

142 CRUSHING-GRINDING

Reducing and separating materials into smaller particles, such as granules, grits, crumbs, chips, powder, paste, and pulp, by means of compressing, cutting, and smashing.

METHODS VERBS

Beating
Blowing
Chopping
Dispersing
Kneading
Mashing
Milling (grain)
Pulpifying
Pulverizing
Rolling
Tapping
Tumbling

Typical Occupations: Miller Supervisor, Powdered-Sugar-Pulverizer Operator, Concrete-Patch-Plant Operator, Wood-Grinder Operator, Pulper.

143 MIXING

Combining and mingling liquid and solid materials to produce a single mass or compound.

METHODS VERBS

Agitating
Blending
Dissolving
Homogenizing
Scooping
Scraping
Stirring

Typical Occupations: Feed Blender, Paint Mixer, Fertilizer Mixer, Tobacco Blender, Clay-Preparation Supervisor.

144 DISTILLING

Refining and concentrating substances (following expulsion of gases and vapors) and recapturing and condensing gases and vapors driven off by heating liquids and solids in retorts, stills, and similar equipment.

METHODS VERBS

Boiling Off
Breaking Down
Burning
Charging
Compressing
Cooling
Cracking
Dehydrogenating
Drawing Off
Evaporating
Firing
Liquefying
Melting
Percolating
Refluxing
Sweating (wax)

Typical Occupations: Fermentation Operator, Still Operator, Tomato-Paster Maker, Sugar Boiler, De-Alcholizer.

145 SEPARATING

Separating substances and materials in mixtures from remainder of mixture components for purposes other than cleaning by means of filtering, sifting, straining, squeezing, centrifugal pressure, gravity precipitation, and agitation.

METHODS VERBS

Blowing
Bolting (grain)
Draining
Drawing Off
Gaging
Heating
Pressing
Screening
Shaking
Sizing
Stirring
Washing

Typical Occupations: Centrifugal Operator, Nut Sorter, Filter Tender, Brine-Tank-Separator Operator, Char-Filter Operator, Cocoa-Press Operator.

146 COOKING - FOOD PREPARING

Preparing food for human and animal consumption, by methods which may include those specific to other defined work fields. Distinguish from Butchering-Meat Cutting (034), which involves slaughtering domestic animals, poultry, and fish, and dressing and processing meats for marketing.

METHODS VERBS

Basting
Boiling
Brewing
Churning
Curing
Flavoring
Frying
Heating
Kneading
Measuring
Pasteurizing
Pickling
Rendering
Roasting
Rolling
Seasoning
Spreading
Squeezing

Typical Occupations: Brewer, Chef, Cottage-Cheese Maker, Baker, Cook.

147 PROCESSING-COMPOUNDING

Processing materials other than food and photographs to attain desired results by three or more of the following work fields: Baking-Drying (141), Distilling (144), Heat Conditioning (133), Melting (131), Mixing (143), Saturating (152), and Separating (145). Jobs involved with only one or two of these work fields are to be assigned those work fields only. Distinguish from Cooking-Food Preparing (146), which involves food processing and from Developing-Printing (202), which involves processing of photographs.

METHODS VERBS

Amalgamating
Boiling
Carbonating
Charging
Compounding
Cooking
Heating
Neutralizing
Oxidizing
Percolating
Polymerizing
Precipitating
Roasting
Stirring
Titrating

Typical Occupations: Chemical-Laboratory Technician, Pharmacist, Refinery Operator.

151 IMMERSING-COATING

Covering the surface of objects with a protective and decorative coating of liquid materials which dry and set by plunging, dipping, and otherwise submerging objects in the material. Distinguish from Brushing-Spraying (153), which does not involve the immersing method of coating; from Electroplating (154), in which immersing is a step in the electrolytic treatment of objects; and from Saturating (152), which involves impregnating materials rather than covering and coating objects.

METHODS VERBS

Draining
Dumping
Rolling
Squeezing
Suspending
Wiping

Typical Occupations: Coating-Machine Operator, Dipper, Impregnating-Tank Operator, Roofing-Machine Operator, Wire-Coating Supervisor.

152 SATURATING

Impregnating materials with other substances (generally in solution) by dyeing, starching, shrinking, preserving, and softening to impart particular qualities. Distinguish from Brushing-Spraying (153), which involves coating without immersion; Electroplating (154), which involves electrolytic treatment of objects; and Immersing-Coating (151), which involves covering and coating materials.

METHODS VERBS

Bleaching
Boiling
Immersing
Liming
Moistening
Rinsing
Spraying
Spreading
Steaming
Stirring
Submerging

Typical Occupations: Rug Dyer, Shoe Dyer, Bleach-Range Operator, Cloth-Mercerizer Operator, Hide-and-Skin Colorer.

153 BRUSHING-SPRAYING

Covering the surfaces of objects with protective and decorative coating, such as waxes, paints, lacquers, and other compounds that dry and set. Equipment and tools used generally include brushes, rollers, and spray guns. Distinguish from Immersing-Coating (151), which involves submerging objects in solutions and from Artistic Painting-Drawing (262), which involves producing designs or lettering.

METHODS VERBS

Burning Off
Filling
Masking
Matching
Mixing
Rolling
Rubbing
Scraping
Spreading
Staining
Varnishing
Whitewashing

Typical Occupations: Jewelry Coater, Electrostatic Painter, House Painter, Spray Painter, Waterproofing Supervisor.

154 ELECTROPLATING

Covering the surface of objects with a coating of material by electrolysis. Distinguish from Immersing-Coating (151), in which coating is not accomplished by electrical action, although immersing the objects is a step in the process.

METHODS VERBS

Brushing
Dipping
Dusting
Electrodepositing
Immersing
Rolling

Typical Occupations: Electrogalvanizing-Machine Operator, Production Plater, Optical-Glass Silverer, Zinc-Plating-Machine Operator.

161 COMBING-NAPPING

Cleaning, disentangling, and straightening material by forcing it through prongs of a comb and raising and producing a nap on materials. Includes such mechanical action as directing jets of air against yarn to change its physical structure and increase its bulk.

METHODS VERBS

Fluffing
Pulling
Shredding
Splitting
Texturing

Typical Occupations: Carding Supervisor, Comber Tender, Card Tender, Napper Tender, Mannequin-Wig Maker.

162 SPINNING

Combining, drawing out, and twisting material into strand-like form. Distinguish from Die-Sizing (135), in which material (usually metal and plastic) may be extruded and drawn into strand-like form, but without twisting.

METHODS VERBS

Splicing
Threading
Tying

Typical Occupations: Drawing-Frame Tender, Winding-and-Twisting-Department Supervisor, Bow-String Maker, Frame Spinner.

163 WINDING

Coiling material about an object to form a spool or ball of the material or to cover the object.

METHODS VERBS

Bunching
Coning
Lacing
Reeling
Splitting
Spooling
Threading
Tying

Typical Occupations: Yarn Winder, Cloth-Winding Supervisor, Wire-Winding-Machine Tender, Coil Winder, Mainspring Winder and Oiler.

164 WEAVING

Interlacing strands of yarns, wires, and other strand-like materials with other yarns, wires, and other strand-like materials to form textiles, wire, and similar products. Distinguish from Knitting (165), in which single strands are looped and Tufting (166), in which interlacing is not present.

METHODS VERBS

Braiding
Doffing
Drawing
Knotting
Picking
Tying

Typical Occupations: Endless-Belt-Weaving Supervisor, Carpet Weaver, Weaving Supervisor.

165 KNITTING

Interlacing strands of material in a series of connected loops to form textiles, wire, and similar products. Distinguish from Weaving (164), in which multiple strands are interlaced and Tufting (166), in which no interlacing occurs.

METHODS VERBS

Creeling
Crocheting
Hooking
Knotting
Looping
Stringing
Threading
Typing

Typical Occupations: Knitting-Machine Operator, Seamless-Hosiery Knitter, Knitting Supervisor, Trawl-Net Maker.

166 TUFTING

Inserting tufts and loops of yarn through material, by hand and machine, without interlacing or interlocking yarn. Distinguish from Weaving (164), which involves interlacing of strands; from Knitting (165), in which strands are looped; and from Sewing-Tailoring (171), which involves fastening materials principally with needle and thread.

METHODS VERBS

Clustering
Drawing Through
Hooking

Typical Occupations: Tufting Supervisor, Rug-Frame Mounter, Tuft-Machine Operator, Rug Hooker, Burler.

171 SEWING-TAILORING

Joining, mending, and fastening materials with needle and thread by hand and machine. Includes simulated sewing by ultrasonic machines.

METHODS VERBS

Basting
Binding
Darning
Embroidering
Gathering
Hemming
Hemstitching
Measuring
Padding
Patching
Puckering
Ripping
Serging
Stretching
Stuffing
Tucking

Typical Occupations: Luggage Repairer, Book-Sewing-Machine Operator, Quilting-Machine Operator, Upholstery Sewer, Ultrasonic-Seaming-Machine Operator, Sewing-Machine Operator.

182 ETCHING

Wearing away the surface of materials by the corrosive action of chemicals on exposed parts of material.

METHODS VERBS

- Corroding
- Desensitizing
- Dusting
- Photoengraving
- Scoring
- Scratching
- Scribing

Typical Occupations: Etcher, Silk-Screen Etcher, Glass Etcher.

183 ENGRAVING

Inscribing the surface of material by incising.

METHODS VERBS

- Carving
- Chasing
- Graving
- Impressing
- Intensifying
- Shading

Typical Occupations: Engraving Supervisor, Engraver, Pantographer.

191 PRINTING

Reproducing records of data and designs by transfer of ink and dye to surface of materials by use of type, plates, dies, silkscreens, and stencils. Includes typesetting, compositing, and reproducing printed matter by use of computerized typesetting and word-processing equipment.

METHODS VERBS

- Coating
- Composing
- Dampening
- Embossing (raised printing)
- Immersing
- Inking
- Measuring
- Moistening
- Registering
- Setting (type)
- Stamping
- Stenciling

Typical Occupations: Addressing-Machine Operator, Typesetting Supervisor, Silk-Screen Printer, Compositor, Web-Press Operator, Letter-Press Operator, Offset-Press Operator.

192 IMPRINTING

Indenting and perforating the surfaces of products to reproduce records of data by mechanical means. Distinguish from Pressing-Forging (134), which involves change of shape and form of products rather than indentation of surfaces.

METHODS VERBS

Brushing
Embossing
Heating
Leveling
Pressing
Spreading
Stamping

Typical Occupations: Embosser, Name-Plate Stamper, Leather Stamper.

201 PHOTOGRAPHING

Producing records (images) of things, people, places, and data by chemical changes on a sensitized surface (as a film) and by electronic means induced by light and similar waves.

METHODS VERBS

Exposing
Focusing
Framing
Lighting
Posing
Zooming

Typical Occupations: Motion-Picture Photographer, Radiographer, Photocopying-Machine Operator, Audiovisual-Production Specialist, Lithographic-Plate Maker.

202 DEVELOPING-PRINTING

Reproducing records of data and designs by chemical means.

METHODS VERBS

Coating
Cropping
Drying
Enlarging
Immersing
Masking
Opaquing
Projecting
Rubbing
Soaking
Spotting
Whirling

Typical Occupations: Film-Processing Supervisor, Film Developer, Film-Laboratory Technician, Developer, Film Printer.

211 APPRAISING

Evaluating and estimating the quality and value of data and things based on knowledges and judgment acquired through experience and training and by conducting performance tests. Includes interpretation of findings that may influence variations in machinery setups, formula modifications, and product processing. Whenever the techniques of Appraising require a technical background in another work field, assign that work field also. Distinguish from Inspecting-Measuring-Testing (212), which primarily involves comparison with predetermined standards.

METHODS VERBS

Alining
Breaking
Calibrating
Classifying
Diluting
Dissolvng
Driving

Feeling
Gaging
Investigating
Magnetizing
Magnifying
Marking
Measuring

Meshing
Sieving
Smelling
Stretching
Tasting
Tearing
Testing

Timing
Trying Out
Turning
Twisting
Typing (blood)
Validating
Weighing

Typical Occupations: Metallurgical-and-Quality-Control-Testing Supervisor, Medical-Laboratory Technician, Real-Estate Appraiser, Fire Inspector.

212 INSPECTING-MEASURING-TESTING

Examining materials and products to verify conformance to predetermined standards and characteristics, such as size, weight, composition, and color. Distinguish from Appraising (211), which involves evaluating things and data based primarily on judgment and knowledge rather than on comparison with readily verifiable standards.

METHODS VERBS

Bending
Breaking
Culling
Detecting
Feeling

Gaging
Grading
Marking
Matching
Picking

Shaking
Stretching
Tearing
Turning
Twisting

Verifying
Weighing

Typical Occupations: Shipping-and-Receiving Weigher, Spring Tester, Bowling Ball Weigher and Packer, Production Weigher, Quality Control Inspector.

221 STOCK CHECKING

Receiving, storing, issuing, requisitioning, and accounting for stores of materials and materials in use; involves the physical handling of the materials. Representative job activities covered by this work field include processing records and keeping materials on hand in balance with operational needs; assigning locations and space to items according to size, quantity, and type; verifying quantity, identification, condition, and value of items and the physical handling of items, such as binning, picking, stacking, and counting; receiving, checking, and delivering items; verifying completeness of incoming and outgoing shipments; preparing and otherwise committing stocks for shipment; keeping and conducting inventory of merchandise, materials, stocks, and supplies; filling orders and requisitions; and issuing tools, equipment, and materials.

METHODS VERBS

Cataloging
Marking
Matching
Measuring
Ordering
Posting
Pricing
Punching
Replacing
Replenishing
Routing
Securing
Selecting
Shelving
Sorting
Tagging
Transcribing
Tying

Typical Occupations: Stock Clerk, Distribution-Warehouse Manager, Librarian, Mail Clerk, Parts Clerk, Order Filler, Shipping-and-Receiving Clerk.

231 VERBAL RECORDING-RECORDKEEPING

Preparing, keeping, sorting, and distributing records and communications, primarily verbal in character but including symbol devices, to communicate and systematize information and data by methods not specifically defined elsewhere, as in Developing-Printing (202), Imprinting (192), Photographing (201), Printing (191), and Stock Checking (221). Distinguish from Numerical Recording-Recordkeeping (232), where records are also involved but the primary activity is computation.

METHODS VERBS

Addressing
Checking
Collating
Counting
Editing
Filing
Listing
Locating
Mailing
Marking
Posting
Punching
Reading
Routing
Searching
Segregating
Selecting
Stamping
Taking Dictation
Taking Minutes
Typing
Verifying
Writing

Typical Occupations: Secretary, Stenographer, File Clerk, Typist.

232 NUMERICAL RECORDING-RECORDKEEPING

Systematizing information on transactions and activities into accounts and numerical records through the application of arithmetic, bookkeeping, statistics, and other quantitative procedures (including paying and receiving money). Distinguish from Verbal Recording-Recordkeeping (231), in which the primary activity is the keeping of records without computation.

METHODS VERBS

Adding
Auditing
Balancing
Cashiering
Checking
Coding
Counting
Disbursing
Dividing
Endorsing
Entering
Grouping
Itemizing
Listing
Making Change
Matching
Multiplying
Posting
Prorating
Recapitulating
Sorting
Stamping
Subtracting
Tabulating
Totaling
Typing
Verifying
Writing

Typical Occupations: Actuary, Accountant, Bookkeeper, Teller, Cashier, Posting Clerk.

233 DATA PROCESSING

Processing alphabetic, numeric, and symbolic data to produce business, technical, scientific, and other records and reports by means of electronic and electromechanical data-processing systems and computer operations. Includes developing computer programs and entering data by use of machines equipped with typewriter-like keyboards. Distinguish from Verbal Recording-Recordkeeping (231) and Numerical Recording-Recordkeeping (232), which primarily involve the keeping of records without computerized data processing; and from Printing (191), in which computerized equipment is used in reproducing printed matter.

METHODS VERBS

Coding
Deleting
Documenting
Editing
Entering
Generating
Inputting
Keying In
Keypunching
Monitoring
Outputting
Planning
Programing
Reconciling
Retrieving
Scheduling
Storing
Transcribing
Transferring
Typing
Verifying

Typical Occupations: Programer, Systems Analyst, Computer Operator, Word Processor, Terminal Operator.

241 LAYING OUT

Plotting reference points or tracing working diagrams onto surfaces of materials as guides in the working and processing of the materials. Distinguish from Styling (264), which includes spacing and positioning of objects and parts, printed material, and artwork that is sometimes termed "layout" work.

METHODS VERBS

Blocking
Chalking
Coating
Dotting
Draping
Inscribing
Outlining
Perforating
Pinning
Scoring
Scratching
Scribing
Stamping
Tapping
Transferring

Typical Occupations: Tool-and-Die Maker, Patternmaker, Model Maker, Template Maker.

242 DRAFTING

Drawing plans, diagrams, graphs, tables, charts, and maps of things, places, and data to be used by others. Drawings are usually to scale and reflect aspects of the subject delineated, such as dimensions and weight.

METHODS VERBS

Detailing
Diagramming
Lettering
Measuring
Plotting
Sketching
Tracing

Typical Occupations: Drafter, Technical Illustrator, Map Editor.

243 SURVEYING

Taking linear and angular measurements to ascertain the contour, dimensions, and position of the earth's surface. Included are such survey specialties as cartography, construction, property, geodesy, hydrography, topography, mining, photogrammetry, land development, and mapping.

METHODS VERBS

Calculating
Locating
Marking
Measuring
Pacing
Plotting
Staking
Taping

Typical Occupations: Surveyor, Geodesist, Navigator.

244 ENGINEERING

Planning and designing machinery, structures, and systems to develop and utilize the properties of matter, work capacities of people, and sources of power, on the basis of known facts, principles, and theories. Included are such engineering disciplines as ceramic, electrical, electronic, civil, mechanical, industrial, and chemical.

METHODS VERBS

Calculating
Formulating
Investigating
Scheduling
Testing
Writing

Typical Occupations: Architect, Aerodynamist, Mechanical Engineer, Chemical Engineer, Metallurgist, Urban Planner, Industrial Engineer.

251 RESEARCHING

Inquiring into fundamental knowledge areas, such as social, physical, and allied sciences, industry, and commerce, for the purpose of discovering facts and making interpretations, and revising and verifying recognized conclusions, theories, laws, and procedures in the light of newly discovered facts. Additionally, this work field includes formulating and testing hypotheses on the basis of information obtained by using specialized apparatus and techniques, by making expeditions, and by reading or observing. When expertise in another work field is required, assign that work field also.

METHODS VERBS

Analyzing
Classifying
Collecting
Defining
Dissecting
Documenting
Examining
Experimenting
Innoculating
Isolating
Locating
Measuring
Reporting
Synthesizing
Writing

Typical Occupations: Research Engineer, Operations-Research Analyst, Physicist, Geologist, Botanist, Curator, Consultant.

261 WRITING

Reporting, editing, promoting, translating, and interpreting ideas in written form. Excludes translation of spoken foreign passages and sign language of the deaf which is included in Information Giving (282).

METHODS VERBS

Adapting
Analyzing
Criticizing
Depicting
Describing
Outlining
Proofreading
Reading
Summarizing
Verifying

Typical Occupations: Copywriter, Critic, Playwright, Newscaster, Reporter, Editor, Proofreader.

262 ARTISTIC PAINTING-DRAWING

Creating and reproducing designs of lettering and depicting ideas pictorially to achieve functional and aesthetic effects, using color media (oil paints, tempera, water colors, etc.) and devices, such as pencils, crayons, brushes, and spray guns. Distinguish from Brushing-Spraying (153) and Immersing-Coating (151), which involve covering objects but without producing designs or lettering.

METHODS VERBS

Blanking Out
Blocking Out
Coloring
Copying
Inking
Rubbing
Shading
Sketching
Spotting Out
Spraying
Tinting
Touching Up
Tracing
Wiping

Typical Occupations: Painting Restorer, Cartoonist, Illustrator, Painter, Music Copyist.

263 COMPOSING-CHOREOGRAPHING

Originating and interpreting ideas in musical form. Includes creating dynamic body movements to rhythmically express various music forms.

METHODS VERBS

Arranging
Harmonizing
Orchestrating
Scoring
Translating
Transposing
Writing

Typical Occupations: Choreographer, Composer, Orchestrator, Arranger.

264 STYLING

Designing and arranging objects, products, and materials for functional and aesthetic purposes. Frequently involves preparing work sketches and drawings, making models and prototypes, and producing sample items.

METHODS VERBS

Adapting
Cutting
Decorating
Displaying
Laying Out
Modifying
Molding
Placing
Sketching
Tracing

Typical Occupations: Landscape Architect, Art Director, Display Designer, Hair Stylist.

271 INVESTIGATING

Securing and evaluating data about persons, places, and incidents for purposes such as solving criminal cases; settling claims; estimating credit risks; determining the qualifications, integrity, and loyalty of people; assessing eligibility for social-service-assistance programs; and insuring compliance with laws and regulations. Distinguish from Researching (251), which involves inquiry and examination into areas of fundamental knowledge.

METHODS VERBS

Advising
Enforcing
Inquiring
Inspecting
Interrogating
Interviewing
Questioning
Scanning
Searching

Typical Occupations: Market-Research Analyst, Coroner, Caseworker, Claims Examiner, Detective.

272 LITIGATING

Carrying out legal procedures, such as prosecuting and defending by pleading case, presenting evidence, debating in court, drawing up legal papers, and interpreting statutes.

METHODS VERBS

Adjudicating
Advising (clients)
Arbitrating
Cross-Examining
Probating
Questioning
Trying (cases)

Typical Occupations: Lawyer, Judge, Patent Agent.

281 SYSTEM COMMUNICATING

Effecting the transmission of information through electrical and electronic systems. Distinguish from Information Giving (282), which involves direct contact with the public in receiving and obtaining information to be transmitted.

METHODS VERBS

Announcing
Calling
Dispatching
Entering
Receiving
Relaying
Retrieving
Ringing
Sending
Transmitting
Tuning

Typical Occupations: Air-Traffic Coordinator, Recording Engineer, Telephone Operator, Dispatcher, Telegrapher, Motion-Picture Projectionist.

282 INFORMATION GIVING

Providing information to people regarding places, events, programs, and procedures. Distinguish from the giving of information, which is involved in accomplishing such objectives as those of Accommodating (291), Merchandising-Sales (292), Teaching (296), and System Communicating (281). Includes giving information over the phone in response to an inquiry.

METHODS VERBS

Advising
Answering
Explaining
Informing
Lecturing
Reading
Receiving
Speaking

Typical Occupations: Guide, Home Economist, Announcer, Information Clerk, Receptionist.

291 ACCOMMODATING

Providing specialized personal convenience and physical services to people and animals. Distinguish from services provided in Health Caring-Medical (294).

METHODS VERBS

- Attending
- Bathing
- Currying
- Cutting (hair)
- Dressing
- Escorting
- Exercising
- Feeding
- Greeting
- Grooming
- Introducing
- Making Arrangements
- Manicuring
- Massaging
- Paging
- Posting
- Running Errands
- Shampooing
- Tinting
- Ushering
- Waiting (on)
- Watering (animals)
- Waving (hair)

Typical Occupations: Undertaker, Waitress, Cosmetologist, Barber, Attendant, Animal Caretaker.

292 MERCHANDISING-SALES

Buying, selling, renting, and demonstrating materials, products, and services, usually in retail and wholesale establishments. Includes soliciting contributions of money and time for charitable and other causes. Distinguish from Information Giving (282).

METHODS VERBS

- Collecting
- Describing
- Displaying
- Distributing
- Fitting
- Interviewing
- Leasing
- Negotiating
- Peddling
- Promoting
- Purchasing
- Showing
- Supplying
- Taking Tickets

Typical Occupations: Sales Engineer, Sales Manager, Sales Agent, Auctioneer, Dispensing Optician, Salesperson.

293 PROTECTING

Protecting human, animal, and plant life and property against loss from fire, pests, and other natural hazards, and from negligence, criminal acts, and unlawful practices. Includes work situations, such as maintaining peace and order, directing traffic, patrolling establishments and areas, and apprehending lawbreakers; extinguishing fires; and exterminating pests.

METHODS VERBS

- Burning
- Cautioning
- Conserving
- Demolishing
- Draining
- Dusting
- Firefighting
- Fumigating
- Guarding
- Policing
- Spraying

Typical Occupations: Park Ranger, Security Guard, Firefighter, Police Officer, Exterminator, Dog Catcher, Ski Patroller.

294 HEALTH CARING-MEDICAL

Treating people and animals with physical and mental problems. Distinguish from Accommodating (291) and Advising-Counseling (298).

METHODS VERBS

- Bandaging
- Bathing
- Diagnosing
- Disinfecting
- Examining
- Exercising
- Injecting
- Innoculating
- Interviewing
- Investigating
- Massaging
- Monitoring
- Prescribing
- Quarantining
- Rubbing
- Taking Pulse
- Treating

Typical Occupations: Anesthesiologist, General Practitioner, Psychiatrist, Dentist, Oral Surgeon, Nurse, Physical Therapist, Podiatrist, Veterinarian.

295 ADMINISTERING

Managing and directing people, organizations, programs, and activities, above the first-line supervision level.

METHODS VERBS

- Analyzing
- Authorizing
- Contracting
- Coordinating
- Formulating
- Hiring
- Negotiating
- Planning
- Scheduling

Typical Occupations: Principal, Dean, Director, Manager, Superintendent.

296 TEACHING

Instructing and training people and animals. Distinguish from Information Giving (282).

METHODS VERBS

- Demonstrating
- Directing
- Examining
- Grading
- Lecturing
- Observing
- Planning
- Reviewing
- Supervising
- Testing

Typical Occupations: Faculty Member, Instructor, Teacher, Dramatic Coach, Animal Trainer.

297 ENTERTAINING

Exhibiting specialized artistic, physical, or mental skills to amuse or divert audiences.

METHODS VERBS

- Acting
- Balancing
- Conducting
- Dancing
- Demonstrating
- Impersonating
- Juggling
- Lecturing
- Miming
- Performing
- Portraying
- Rehearsing
- Singing
- Staging

Typical Occupations: Actor, Dancer, Musician, Orchestra Conductor, Automobile Racer, Professional Athlete; Clown.

298 ADVISING-COUNSELING

Effecting the adjustment of people with financial, vocational, spiritual, educational, and other problems according to established procedures. Distinguish from Accommodating (291), Health Caring-Medical (294), and Litigating (272).

METHODS VERBS

- Arbitrating
- Authorizing
- Consulting
- Evaluating
- Explaining
- Interviewing
- Investigating
- Monitoring
- Planning
- Reporting
- Researching
- Reviewing
- Scheduling
- Suggesting
- Testing
- Visiting

Typical Occupations: Counselor, Clergy Member.

CHAPTER 8

MATERIALS, PRODUCTS, SUBJECT MATTER, AND SERVICES (MPSMS)

Page

Organization of MPSMS....................163

Assigning MPSMS....................164

Organization of MPSMS Groups....................165

Group and Category Codes and Titles, Group Definitions, Illustrative Examples, and Clarification Statements....................167

Alphabetical Listing of MPSMS....................199

CHAPTER 8

MATERIALS, PRODUCTS, SUBJECT MATTER, AND SERVICES (MPSMS)

This Work Performed Component includes:

- Basic **Materials** being processed, such as fabric, metal, or wood.
- Final **Products** being made, cultivated, harvested, or captured, such as wild animals, sponges, field crops, trees, and automobiles.
- Data or **Subject Matter** being dealt with or applied, such as astronomy or journalism.
- **Services** being rendered, such as barbering or janitorial.

MPSMS categories are closely related in organization and content to categories in the *Standard Industrial Classification Manual*[1] (SIC) and to educational classifications of subject matter fields.

Organization of MPSMS

The MPSMS component is organized into 48 groups, with most groups divided into as many as nine categories, totaling 328 categories. The two largest MPSMS groups, 560 & 570 and 700 & 710, contain 12 and 15 categories, respectively. Each of the groups and categories are designated by three-digit codes, with the group codes always ending in zero. Group codes and titles are assigned when three or more specific categories in the same group are encompassed, or when the material referred to is of a general nature within the three-digit group. Most groups have categories ending in "9," which include MPSMS not classified in other categories within the group. The organization of the MPSMS groups is shown on pp. 165-167.

The complete classification of the MPSMS groups and their categories appears on pp. 167-199. Immediately following each group code and title is a brief explanatory statement defining the group's limits and broadly indicating the general occupations and industries included in that group. This is followed by a cross-reference statement that alerts the reader to closely related MPSMS found in other groups and indicates the distinction between the related MPSMS.

---

[1] *Standard Industrial Classification Manual* (Washington: Executive Office of the President, Bureau of the Budget, 1972)

The codes and titles of the categories comprising the group are listed under each group definition. Additionally, many categories are illustrated by specific items in parentheses immediately following the category titles. These examples are not intended to completely represent the individual categories but can facilitate decisions as to whether a specific MPSMS is encompassed in an individual category.

The alphabetical listing of MPSMS and their corresponding codes, beginning on page 199, is helpful in locating the appropriate MPSMS group and category titles for materials, products, subject matter, or services specifically named in the group or category titles, the group definitions, or the illustrative examples.

Assigning MPSMS

When assigning MPSMS, apply the Sentence Analysis Technique (see p. 10 and pp. 82-85) to avoid confusing work devices with materials and products and/or to facilitate the assignment of a subject matter or service category.

The MPSMS classification for a given job is generally based on the overall purpose of the job, usually reflected by the knowledge required of the worker. In production jobs, the MPSMS classificaton can be a material or a final product; it is based on the end-product of the job and not necessarily the end-product of the establishment. For example, a fabric cutter in a furniture plant is assigned an MPSMS category in Group 420, FABRICS AND RELATED, not in Group 460, FURNITURE AND FIXTURES.

First-line supervisory jobs are usually assigned the basic MPSMS classifications of the workers supervised. Repairer jobs are assigned only the products MPSMS classifications of the items repaired. Machine cleaning and lubricating jobs are assigned the products MPSMS classifications of the machines cleaned and lubricated. Teaching jobs that involve specific subject areas are assigned both the subject matter classifications of the specific subjects taught as well as EDUCATIONAL SERVICES, 931; teachers who teach a range of subjects, such as elementary school teachers, are assigned only 931. Commodity-sales jobs are assigned the appropriate category under MERCHANDISING SERVICES, 880, as well as the material or product MPSMS classification for the item sold; if a variety of commodities are sold, only 880 is assigned.

Organization of MPSMS Groups

MATERIALS AND PRODUCTS

300	PLANT FARM CROPS
310	HORTICULTURAL SPECIALTIES, FOREST TREES, AND FOREST PRODUCTS
320	ANIMALS
330	MARINE LIFE
340	RAW FUELS AND NONMETALLIC MINERALS
350	RAW METALLIC MINERALS
360	STRUCTURES
370	ORDNANCE
380	FOOD STAPLES AND RELATED
390	FOOD SPECIALTIES
400	TOBACCO PRODUCTS
410	TEXTILE FIBERS AND RELATED
420	FABRICS AND RELATED
430	TEXTILE PRODUCTS
440	APPAREL
450	LUMBER AND WOOD PRODUCTS
460	FURNITURE AND FIXTURES
470	PAPER AND ALLIED PRODUCTS
480	PRINTED AND PUBLISHED PRODUCTS
490	CHEMICAL AND ALLIED PRODUCTS
500	PETROLEUM AND RELATED PRODUCTS
510	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS

520	LEATHER AND LEATHER PRODUCTS
530	STONE, CLAY, AND GLASS PRODUCTS
540	METAL, FERROUS AND NONFERROUS
550	FABRICATED METAL PRODUCTS, EXCEPT ORDNANCE, MACHINERY, AND TRANSPORTATION EQUIPMENT
560 & 570	MACHINERY AND EQUIPMENT, EXCEPT ELECTRICAL
580	ELECTRICAL AND ELECTRONIC MACHINERY, EQUIPMENT, AND SUPPLIES
590	TRANSPORTATION EQUIPMENT
600	MEASURING, ANALYZING, AND CONTROLLING INSTRUMENTS; PHOTOGRAPHIC, MEDICAL, AND OPTICAL GOODS; AND WATCHES AND CLOCKS
610	MISCELLANEOUS FABRICATED PRODUCTS

SUBJECT MATTER

700 & 710	ARCHITECTURE AND ENGINEERING
720	MATHEMATICS AND PHYSICAL SCIENCES
730	LIFE SCIENCES
740	SOCIAL SCIENCES
750	ARTS AND LITERATURE

SERVICES

850	TRANSPORTATION SERVICES
860	COMMUNICATION SERVICES
870	ELECTRIC, GAS, AND SANITARY SERVICES
880	MERCHANDISING SERVICES
890	GENERAL BUSINESS, FINANCE, INSURANCE, AND REAL ESTATE SERVICES

900 DOMESTIC, BUILDING, AND PERSONAL SERVICES

910 AMUSEMENT AND RECREATION SERVICES

920 MEDICAL AND OTHER HEALTH SERVICES

930 EDUCATIONAL, LEGAL, MUSEUM, LIBRARY, AND ARCHIVAL SERVICES

940 SOCIAL, EMPLOYMENT, AND SPIRITUAL SERVICES

950 GOVERNMENT AND RELATED SERVICES

960 MISCELLANEOUS SERVICES

Group and Category Codes and Titles, Group Definitions, Illustrative Examples, and Clarification Statements

MATERIALS AND PRODUCTS

300 PLANT FARM CROPS

This group includes field crops, vegetables, melons, fruits, and tree nuts in a nonprocessed state produced by farmers, harvesters, sorters, graders, packers, and related workers customarily employed in agricultural establishments, such as farms, orchards, and vineyards. Plant farm crop produce or products in a manufactured, preserved, or otherwise processed state are classified in Groups 380 or 390 or with those products or materials to which they are most closely related (confectionary products, cider, wines, yarn, etc.)

301 Grains

302 Field Crops, except Grain (cotton, tobacco, sugar crops, peanuts, hay, etc.)

303 Vegetables and Melons

304 Citrus Fruits

305 Fruits, except Citrus (including berries, grapes, olives, dates, etc.)

306 Tree Nuts

310 HORTICULTURAL SPECIALTIES, FOREST TREES, AND FOREST PRODUCTS

This group includes nursery and forest products in a nonprocessed state produced by nursery and greenhouse workers, forest-product gatherers, and related workers customarily employed in agricultural and forestry establishments, such as greenhouses, nurseries, tree farms, forest nurseries, and timber tracts. Logs, cut timber, and forest products in a processed state are classified in Group 450 or with those products or materials to which they are most closely related (furniture, musical instruments, caskets, etc.)

311 Floricultural and Related Nursery Products (bulbs, florists' greens, flowers, shrubbery, flower and vegetable seeds, and plants, sod, etc.)

312 Ornamental Trees

313 Standing Timber (including Christmas trees)

314 Forest Nursery Products (reforestation, including tree seeds)

319 Horticultural Specialties, Forest Trees, and Forest Products, n.e.c. (balsam needles, barks, crude rubber, ginseng, gums, maple sap, mushrooms, Spanish moss, natural resins, teaberries, etc.)

320 ANIMALS

This group includes animals raised, bred, cared for, hunted, and trapped by farmers, ranchers, breeders, shearers, product gatherers, hunters, trappers, operators of game preserves, animal caretakers, and related workers customarily employed in agricultural, hunting and trapping, and amusement and recreation establishments, such as farms, ranches, dairies, hatcheries, game preserves, circuses, and zoos. Animal products in a manufactured, preserved, or otherwise processed state are classified in Groups 380 and 520 or with those products to which they are most closely related (feathers, sporting goods, woolen fabrics, yarn, etc.) Animal trainers are classified in Group 910.

321 Cattle (including raw milk)

322 Hogs

323 Sheep and Goats

324 Poultry and Other Fowl (including eggs)

325 Captive Fur-Bearing Animals

326 Game and Wildlife

327 Horses and Other Equines

329 Animals, n.e.c. (bees, cats, dogs, laboratory animals, zoo animals, etc.)

330 MARINE LIFE

This group includes finfish, shellfish, and other marine life caught, gathered, or cultivated and harvested by fishers, farmers, growers, and related workers customarily engaged in commercial fishing or employed in fish hatcheries and preserves. Seafoods in a canned, cured, or preserved state are classified in Group 380.

331 Finfish

332 Shellfish

339 Marine Life, n.e.c. (sea urchins, terrapins, turtles, whales, frogs, sponges, seaweeds, etc.)

340 RAW FUELS AND NONMETALLIC MINERALS

This group includes fuel and nonmetallic minerals occurring in a natural state, extracted by miners, drillers, blasters, loaders, and related workers customarily employed in mining and quarrying and petroleum production establishments, such as mines, pits, quarries, or well sites. Also included is the milling (crushing, grinding, screening, washing, etc.) of nonmetallic minerals at the mine site or elsewhere by millers, splitters, grinders, and related workers customarily employed in minerals and earths establishments. Fuel or nonmetallic mineral products in a refined, manufactured, or otherwise processed state are classified in Groups 490, 500, and 530, or with those products or materials to which they are most closely related (paints, asphalt, gasoline, glassware, asbestos products, clay products, stone products, etc.)

341 Coal and Lignite

342 Crude Petroleum and Natural Gas

343 Stone, Dimension

344 Stone, Crushed and Broken

345 Sand and Gravel

346 Clay (bentonite, fire clay, fuller's earth, kaolin, etc.)

347 Chemical and Fertilizer Minerals (barite, fluorspar, potash, soda, borate, phosphate rock, rock salt, sulfur, etc.)

349 Raw Fuels and Nonmetallic Minerals, n.e.c. (gypsum, mica, native asphalt, pumice, asbestos, talc, graphite, etc.)

350 RAW METALLIC MINERALS

This group includes metallic minerals occurring in a natural state, extracted by miners, drillers, blasters, loaders, and related workers customarily employed in mining and quarrying establishments, such as mines and pits. Also included is dressing (crushing, grinding, washing, drying, sintering, leaching, and separating) of metal ores by crushers, grinders, leachers, and related workers customarily employed at the mine site, or elsewhere in ore dressing, smelting, and refining establishments. Metallic mineral products in a refined, smelted, manufactured, or otherwise processed state are classified in Groups 540 and 550 or with those products or materials to which they are most closely related (ingots, metal castings, tinware, metal stampings, wire products, silverware, etc.)

351 Iron Ores

352 Copper Ores

353 Lead and Zinc Ores

354 Gold and Silver Ores

355 Bauxite and Other Aluminum Ores

356 Ferroalloy Ores, except Vanadium (including chromium, cobalt, etc.)

357 Mercury Ores

358 Uranium, Radium, and Vanadium Ores

359 Raw Metallic Minerals, n.e.c. (including ores such as antimony, beryllium, platinum, tin, titanium, etc.)

360 STRUCTURES

This group includes buildings and heavy construction (1) constructed, erected, installed, or razed by carpenters, bricklayers, plumbers, riggers, pavers, structural-steel workers, track layers, wreckers, and other construction industry workers customarily employed in onsite construction projects, and (2) maintained or repaired by various maintenance and repair workers customarily employed by other industries occupying or operating the structures. This group includes special trade contractors engaged in specialized construction activities, such as plumbing, painting, carpentering, etc. (See SIC Major Group 17.) Prefabricated wooden buildings and mobile homes are classified in Group 450 while prefabricated metal buildings are classified in Group 550. The utilization of structures to render a transportation, public utility, or other service is classified under Groups 850 and 870 while the extraction of raw materials from excavations or mines is classified in Groups 340 and 350.

361 Buildings, except Prefabricated (residential, farm, industrial, commercial, public, etc.)

362 Highways and Streets (including athletic fields, airports, bridle paths, parking areas, parkways, etc.)

363 Bridges, Tunnels, Viaducts, and Elevated Highways

364 Water, Gas, and Sewer Mains; Pipelines; and Communication Lines and Powerlines (cable lines, radio and television transmitting towers, sewage collection and disposal lines, pumping stations, telegraph and telephone lines, etc.)

365 Marine Construction (harbor and waterway construction, such as breakwaters, canals, channels, cofferdams, dams, dikes, harbors, levees, locks, piers, wharves, etc.)

366 Powerplant Projects (hydroelectric, nuclear, etc.)

367 Railroads and Subways

368 Oil Refineries

369 Structures, n.e.c. (drainage systems; industrial furnaces, incinerators, kilns, and ovens; irrigation systems; ski tows; water-treatment plants; etc.)

370 ORDNANCE

This group includes weapons, parts, and ammunition manufactured or repaired by gunsmiths, machine operators, assemblers, repairers, and related workers customarily employed in ammunition, firearms, ordnance, government and military services, and related establishments (including field repairs). Military tanks and space vehicles are classified in Group 590. Electronic sighting and fire-control equipment is classified in Group 580, while optical sighting equipment is classified in Group 600.

371 Guns, Howitzers, Mortars, and Related Equipment (naval, aircraft, antiaircraft, tank, coast, and field artillery having a bore over 30 mm. or 1.18 inch, and components)

372 Ammunition, except Small Arms (ammunition over 30 mm. or 1.18 inch, including bombs, chemical warfare projectiles, depth charges, grenades, mines, missile warheads, torpedoes, etc.)

373 Small Arms (firearms having a bore of 30 mm. or 1.18 inch and below, and parts)

374 Small Arms Ammunition (ammunition for small arms having a bore of 30 mm. or 1.18 inch and below)

375 Guided Missiles.

379 Ordnance and Accessories, n.e.c. (bazookas, flamethrowers, smoke generators, etc.).

380 FOOD STAPLES AND RELATED

This group includes food staples and animal feeds cured, pickled, smoked, canned, frozen, milled, or otherwise processed by workers customarily employed in slaughtering and meatpacking plants, bakeries, canneries, dairies, grain and feed mills, and related food-processing establishments. Foods in a natural or unprocessed state are classified in Groups 300, 320, and 330. Food specialties, such as sugar, candy, beverages, and coffee, are classified in Group 390.

381 Grain Mill Products (including animal and fowl feeds)

382 Meat Products, Processed (including eggs)

383 Dairy Products

384 Bakery Products

385 Oils and Fats, Edible

386 Seafoods, Processed (canned, cured, and fresh or frozen packaged seafoods)

387 Fruits and Vegetables, Processed (canned, dried, dehydrated, frozen, and pickled fruits and vegetables, including preserves, jams, jellies, juices, sauces, seasonings, and salad dressings; and canned specialties, such as baby foods, "native foods," health foods, and soups)

390 FOOD SPECIALTIES

This group includes coffee, sugar, confectionery products, beverages, flavoring extracts, and other food specialties processed by workers customarily employed in a wide variety of food-processing establishments. Food-staple products, such as meat, dairy, bakery, and grain-mill products, and processed fruits, vegetables, and seafoods, are classified in Group 380.

391 Coffee, Tea, and Spices

392 Sugar and Sirup (cane and beet sugar, sirup, and molasses)

393 Confectionery and Related Products (candy, stuffed dates, salted nuts, chocolate, cocoa, chewing gum, etc.)

394 Flavoring Extracts and Flavoring Sirups

395 Beverages, Alcoholic (wines; malt beverages; and distilled, rectified, and blended liquors)

396 Soft Drinks and Carbonated Waters

397 Macaroni, Spaghetti, Vermicelli, Noodles

398 Vinegar and Cider

399 Food Specialties, n.e.c. (baking powder, ice, yeast, peanut butter, potato chips, etc.)

400 TOBACCO PRODUCTS

This group includes cigarettes, cigars, smoking and chewing tobacco, snuff, and stemmed and redried tobacco processed by workers customarily employed in tobacco-processing establishments. Tobacco in a natural or unprocessed state is classified in Group 300.

401 Cigarettes

402 Cigars

403 Tobacco, Chewing, Smoking, and Snuff

404 Tobacco, Stemmed and Redried

410 TEXTILE FIBERS AND RELATED

This group includes the preparation and/or finishing of natural, synthetic, glass, and silk fibers and the subsequent manufacture and finishing of yarn, thread, twine, and cordage by carders, cleaners, combers, drawers, dyers, mercerizers, pickers, spinners, sorters, texturers, twisters, winders, and related workers customarily employed in textile establishments. The basic manufacture of synthetic and glass fibers is classified in Groups 490 and 530 respectively. Fabrics are classified in Group 420.

411 Yarn

412 Thread

413 Cordage and Twine

414 Fiber Stock (including natural, synthetic, glass, and silk fibers)

419 Textile Fibers and Related, n.e.c. (waste and recovered fibers, etc.)

420 FABRICS AND RELATED

This group includes the manufacture of woven, nonwoven, and knit fabrics produced by weavers, knitters, needle-loom operators, dyers, and related workers customarily employed in a wide variety of textile and related establishments. Rubberized fabrics are classified in Group 510, and coated fabrics in Group 430. Knitted garments, hosiery, blankets, bedsheets, pillowcases, and other textile products are classified in Groups 430 and 440, regardless of where manufactured.

421 Fabrics, Broad Woven Cotton, Synthetic Fiber, Glass Fiber, and Silk

422 Fabrics, Broad Woven Wool (including wool felt and haircloth)

423 Narrow Fabrics and Related Smallwares (ribbons, shoelaces, tapes, etc.)

424 Fabrics, Knitted

425 Fabrics, Nonwoven (except knitted)

429 Fabrics and Related, n.e.c. (linen, jute, hemp, ramie, etc.)

430 TEXTILE PRODUCTS

This group incudes textile products, such as carpets and rugs, fancy textiles, paddings and upholstery filling, coated fabrics, housefurnishings, and canvas products produced by workers customarily employed in a wide variety of textile and related establishments. Textile and rubberized fabrics are classified in Groups 420 and 510 respectively. Apparel is classified in Group 440.

431 Carpets and Rugs (woven, tufted, braided, etc.)

432 Textiles, Fancy (trimmings, hatters' fur, stamped art goods, art needlework, embroideries, lace goods, etc.)

433 Paddings and Upholstery Filling (batting, padding, wadding, and filling)

434 Impregnated and Coated Fabrics (artificial leather, oilcloth, etc. [except rubberized fabric])

435 Housefurnishings (blankets, bedspreads, comforters, curtains, dishcloths, draperies, mopheads, napkins, pillows, pillowcases, quilts, sheets, slipcovers, tablecloths, towels, washcloths, etc.)

436 Canvas and Related Products (textile bags, awnings, tents, tarpaulins, etc.)

439 Textile Products, n.e.c. (felt goods, fishing nets, flags, hammocks, handwoven and crocheted products, parachutes, sleeping bags, etc.)

440 APPAREL

This group includes apparel, except rubber or rubberized, produced by workers, such as cutters, sewers, tailors, pressers, and blockers, customarily employed in textile, knit goods, garment, fur goods, hat and cap, and related establishments. Rubber clothing and rubberized fabrics are classified in Group 510. Footwear is classified in Groups 510 and 520. Leather gloves and mittens, and fur pelts, are classified in Group 520.

441 Men's and Boys' Suits, Coats, and Overcoats (including vests, uniforms, and tuxedos)

442 Men's and Boys' Furnishings, Work Clothing, and Allied Products (shirts, nightwear, underwear, neckwear, trousers, athletic apparel, bathing suits, etc.)

443 Women's, Girls', and Infants' Outerwear (blouses, rompers, shirts, dresses, skirts, suits, coats, neckwear, athletic apparel, bathing suits, etc.)

444 Women's, Girls', and Infants' Undergarments (underwear, nightwear, brassieres, girdles, etc.)

445 Hats (except fur)

446 Hosiery

447 Fur Goods (coats, jackets, hats, neckpieces, and trimmings, etc.)

449 Apparel, n.e.c. (dress and work gloves [except rubber and all leather]; robes and dressing gowns; raincoats and other waterproof outer garments [except rubber or rubberized]; leather and sheepskin-lined clothing; apparel belts; and costumes, diapers, garters, handkerchiefs, suspenders, etc.)

450 LUMBER AND WOOD PRODUCTS

This group includes logs, veneer and plywood, prefabricated wood buildings, mobile homes, particleboard, and wood containers and other articles produced by fallers, loggers, splitters, sawyers, planers, shapers, sanders, jointers, gluers, assemblers, and related workers customarily employed in logging, sawmill, planing mill, cooperage, veneer and plywood, wood preserving, manufactured building, and related woodworking industries. Furniture is classified in Group 460. Prefabricated metal buildings are classified in Group 550. Structures fabricated at the construction site are classified in Group 360.

451 Logs and Hewn Timber Products, Untreated (wood bolts, pilings, poles, posts, fence rails, etc.)

452 Sawmill, Planing Mill, and Treated Wood Products (lumber, fuelwood, cooperage stock, hardwood dimension stock, flooring, shingles, etc.; and doors, moldings, shutters, stairways, window frames, and other millwork products)

453 Veneer and Plywood

454 Wood Containers (including pallets and skids)

455 Prefabricated Wood Buildings, Mobile Homes, and Structural Wood Members

456 Particleboard

457 Wood Articles (clothespins, dowels, gavels, ladders, mallets, marquetry, mirror and picture frames, oars, toilet seats, toothpicks, yardsticks, etc.)

459 Lumber and Wood Products, n.e.c. (cork, rattan, reed, straw, wicker, and willow products)

460 FURNITURE AND FIXTURES

This group includes furniture and fixtures produced by sawyers, shapers, planers, jointers, gluers, welders, riveters, assemblers, and related workers customarily employed in furniture, mattress and bedspring, and window shade and fixture establishments. Concrete and stone furniture are classified in Group 530.

461 Wood Household Furniture, except Upholstered (including television, radio, phonograph, and sewing machine cabinets)

462 Wood Household Furniture, Upholstered

463 Metal Household Furniture

464 Mattress, Bedsprings, and Sofa Beds (chair beds, spring cushions, etc.)

465 Wood Office, Public Building, and Related Furniture (chalkboards, bookcases, pews, desks, etc.)

466 Metal Office, Public Building, and Related Furniture (filing cabinets, bookcases, chairs, etc., including seats for aircraft, automobile, railroad, and other public conveyances)

467 Wood and Metal Fixtures (partitions, shelving, lockers, display cabinets, kitchen cabinets, costumers, display cases, racks, stands, telephone booths, etc.)

468 Plastic, Glass, and Fiberglass Furniture and Fixtures

469 Furniture and Fixtures, n.e.c. (beauty and barber shop equipment; reed, rattan, wicker, and willow furniture and fixtures; and drapery hardware and window blinds and shades)

470 PAPER AND ALLIED PRODUCTS

This group includes pulp, paper, paperboard, building paper, building board, and converted paper products, such as paper bags, boxes, envelopes, and stationary, manufactured by workers customarily employed in paper and pulp and paper-goods establishments. Books, business forms, greeting cards, newspapers, periodicals, and other printed materials produced in printing and publishing establishments are classified in Group 480.

471 Pulp

472 Nonconverted Paper and Paperboard, except Building (paper stock, newsprint, parchment paper, cardboard, etc.)

473 Nonconverted Building Paper and Building Board (asbestos, asphalt, construction, and insulating paper; asphalt board, fiberboard, roofing board, wallboard, etc.)

474 Converted Paper and Paperboard Products, except Containers and Boxes (coated, glazed, or varnished paper; envelopes; paper bags; die-cut paper, paperboard, and cardboard; pressed and molded pulp goods; sanitary paper products; stationary and tablets; corrugated and laminated paper, paper novelties, wallpaper, etc.)

475 Paperboard Containers and Boxes

480 PRINTED AND PUBLISHED PRODUCTS

This group includes books, newspapers, magazines, trade journals, periodicals, greeting cards, business forms, directories, and related printed materials prepared by printing-press operators, bookbinders, and related workers customarily employed by various printing and publishing establishments. Printing types, plates, and rollers prepared (for use by printing-press operators) by lithographic-plate makers, photoengravers, compositors, stenotypers, pantographers, and related workers customarily employed in various printing and publishing establishments are classified in Group 560 & 570.

481 Newspapers

482 Periodicals (comics, magazines, trade journals, etc.)

483 Books and Pamphlets

484 Manifold Business Forms (office and business forms, fanfold forms, salesbooks, etc.)

485 Greeting Cards (except hand painted)

486 Blankbooks, Looseleaf Binders, and Related Products (account books, albums, checkbooks, ledgers and ledger sheets, receipt books, record albums, sample books, etc.)

489 Miscellaneous Published and Printed Products (atlases, catalogs, directories, maps, paper patterns, racetrack programs, sheet music, shopping news, technical papers, etc.)

490 CHEMICAL AND ALLIED PRODUCTS

This group includes the production of basic chemicals, chemical products to be used in further manufacture, and finished chemical products for ultimate consumption or as materials and supplies in other industries. Workers in this group are customarily employed in chemical establishments or related industries, such as primary coal-tar products, coke products, compressed and liquefied gases, druggists' and toilet preparations and medicines, explosives, synthetic fibers, soap and glycerine, and wood distillation and charcoal. The extraction of raw chemical materials from excavations and mines is classified in Groups 340 and 350. Synthetic fiber products, petroleum and related products, and synthetic rubber products are classified in Groups 410 and 420, 500, and 510 respectively. Glass fibers are classified in Group 530.

491 Chemicals, Inorganic (alkalies and chlorine; industrial gases; and inorganic pigments, salts, and compounds, etc.)

492 Plastics Materials and Synthetic Resins; Synthetic Rubber; and Synthetic Fibers, except Glass

493 Drugs (biological products, such as bacterial and virus vaccines, toxoids and analogous products, serums, plasmas, and other blood derivatives; medicinal chemicals and botanical products; and pharmaceutical preparations in form intended for final consumption, such as ampuls, tablets, capsules, vials, ointments, medicinal powders, solutions, and suspensions)

494 Soap, Detergents, and Cleaning Preparations; and Perfumes, Cosmetics, and Other Toilet Preparations

495 Paints, Varnishes, Lacquers, Enamels, and Allied Products (paint and varnish removers, putties, wood fillers and sealers, paintbrush cleaners, etc.)

496 Chemicals, Organic (gum and wood chemicals; cyclic [coal tar] crudes and intermediates, and synthetic organic dyes and pigments; and noncyclic organic chemicals, organic solvents, polyhydric alcohols, synthetic perfume and flavoring materials, rubber-processing chemicals, plasticizers, synthetic tanning agents, chemical warfare gases, and acid and polyhydric alcohol esters, amines, etc.)

497 Agricultural Chemicals (fertilizers and pesticides)

499 Chemical and Allied Products, n.e.c. (adhesives and sealants, explosives, printing ink, carbon black, etc.)

500 PETROLEUM AND RELATED PRODUCTS

This group includes petroleum, paving and roofing materials, fuel briquettes, and coke refined, manufactured, and compounded by workers customarily employed in petroleum refineries and related industries. Petroleum, coal, and asphalt occurring in a natural state are classified in Group 340. Petrochemical products are classified in Group 490 or with those products or materials to which they are most closely related.

501 Petroleum Products (fuel oils, gasoline, illuminating oils, jet fuels, lubricants, paraffin waxes, etc.)

502 Paving Materials (asphalt and tar-paving mixtures and blocks)

503 Roofing Materials (asphalt and other saturated roofing felts, and roofing cements and coatings)

504 Fuel Briquettes, Packaged Fuel, and Powdered Fuel

505 Coke (regardless of where produced)

510 RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS

This group includes tires and tubes, rubber and plastic footwear, rubber and plastic hose and belting, fabricated rubber products, and miscellaneous plastic products as produced by blenders, casters, compounders, curers, driers, extruders, laminators, molders, press operators, and related workers customarily employed in rubber, plastics, and related industries. Rubber products made from synthetic rubber and reclaimed rubber are also included in this classification. Manufacture of plastic materials is classified in Group 490. Plastic furniture, fiberglass boats, and other similar products are classified in Groups 460 and 590 or with the products or materials to which they are most closely related. Leather footwear is classified in Group 520.

511 Tires and Tubes

512 Rubber and Plastic Footwear

513 Reclaimed Rubber

514 Rubber and Plastic Hose and Belting (air-line hose, conveyor belts, plastic or rubber garden hose, heater hose, V-belts, etc.)

519 Rubber and Miscellaneous Plastic Products, n.e.c. (rubberized fabrics; rubber clothing, specialties, and sundries, such as aprons, bathing caps and suits, cloaks, gloves, wet suits, balloons, combs, erasers, life rafts and life jackets, teething rings, toys, and water bottles; and molded plastics and miscellaneous plastic products, such as awnings, bottles, clothespins, downspouts and gutters, ice chests and coolers, hardware, kitchenware, novelties, pipe and pipe fittings, shower stalls, and tableware)

520 LEATHER AND LEATHER PRODUCTS

This group includes hides, skins, and fur pelts; and leather footwear, gloves and mittens, luggage, personal goods, and other products; produced by tanners, dyers, buffers, cutters, trimmers, cementers, assemblers, stitchers, and related workers employed in boot and shoe, fur dressing, glove and mitten, leather manufacturing, and leather products establishments. Fur goods and leather garments are classified in Group 440. Rubber footwear is classified in Group 510.

521 Hides, Skins, and Leather (includes fur pelts)

522 Footwear, except Rubber (boot and shoe cut stock and findings, slippers, sandals, moccasins, athletic shoes, canvas boots, etc.)

523 Leather Gloves and Mittens

524 Luggage of any Material (including attache, camera, musical instrument cases, etc.)

525 Handbags and Related Accessories of any Material (billfolds, jewelry cases, key cases, purses, tobacco pouches, etc.)

529 Leather and Leather Products, n.e.c. (belting, dog collars and leashes, desk sets, razor strops, saddlery, harness, whips, etc.)

530 STONE, CLAY, AND GLASS PRODUCTS

This group includes stone, clay, and glass products machined, processed, fabricated, and repaired by machine operators, processors, fabricators, and related workers customarily employed in abrasive and polishing products, asbestos products, brick and tile, cement, concrete products, glass manufacturing, glass products, mirror, pottery and porcelain, statuary and art goods, and stonework establishments. Crushing, grinding, screening, washing, etc., of nonmetallic minerals are classified in Group 340. Asbestos paper, electric light bulbs, and optical and ophthalmic lenses are classified in Groups 470, 580, and 600 respectively.

531 Flat, Pressed, or Blown Glass and Glassware (float or plate glass, window glass, pressed glass tableware, glass bottles, glass fibers, etc., produced from raw materials)

532 Glass Products Made of Purchased Glass (cut-glass tableware; leaded, stained, and art glass; mosaic glass; ground glass; mirrors; watch crystals; glass novelties; etc.)

533 Cement, Hydraulic (natural, Portland, masonry, etc.)

534 Structural Clay Products (brick and structural clay tile; ceramic wall and floor tile; clay firebrick and other heat resisting clay products; clay drain, roofing, and sewer tile, etc.)

535 Pottery and Related Products (china and earthenware plumbing fixtures and fittings; porcelain electrical supplies; and chinaware, earthenware, porcelain ware, and stoneware)

536 Concrete, Gypsum, and Plaster Products (concrete block, brick, pipe, furniture, etc.; ready-mixed concrete; quicklime and hydrated lime; and gypsum products, such as plaster and plasterboard)

537 Cut Stone and Stone Products (building and monumental stone, cut stone furniture, etc.)

538 Abrasive, Asbestos, and Related Products (abrasive products, such as grinding and buffing wheels, sandpaper, and steel wool; asbestos products, such as building and insulating materials, and brake linings; gaskets; and packing and sealing devices)

539 Stone, Clay, and Glass Products, n.e.c. (mineral wool, nonclay refractories and crucibles, plaster of paris and papier-mache statuary and art goods, etc.)

540 METAL, FERROUS AND NONFERROUS

This group includes pigs and ingots; basic metal shapes, such as plates, sheets, strips, rods, bars, pipes, and tubing; and basic metal products, such as castings, wire, cable, nails, and spikes; smelted, refined, rolled, drawn, extruded, or similarly processed by furnace operators, hot and cold mill operators, casters, mold makers, drawers, extruders, and related workers customarily employed in iron and steel mill, nonferrous metal alloy, foundry, and related establishments. Fabricated metal products are classified according to the type of products to which they are most closely related.

541 Blast Furnace, Steelworks, and Rolling and Finishing Mill Products (pig iron; steel ingots; basic iron and steel shapes, such as plates, sheets, strips, rods, bars, pipes, and tubing; and steel wire, cable, nails, spikes, staples, etc.)

542 Metal Castings (ferrous and nonferrous)

543 Nonferrous Metals, Smelted and Refined (copper, lead, zinc, aluminum, and other nonferrous metal pigs, ingots, slabs, etc.)

544 Nonferrous Metals, Rolled, Drawn, and Extruded (basic nonferrous metal shapes, such as plates, sheets, strips, rods, bars, pipes, and tubing; and nonferrous wire and cable)

549 Metal, Ferrous and Nonferrous, n.e.c. (steel balls; powdered iron; nonferrous nails, spikes, and staples, etc.)

550 FABRICATED METAL PRODUCTS, EXCEPT ORDNANCE, MACHINERY, AND TRANSPORTATION EQUIPMENT

This group includes fabricated metal products, such as metal cans and containers; cutlery, handtools, and general hardware; nonelectric heating apparatus; fabricated structural metal products; forgings and stampings; and fabricated wire products, which are produced by workers customarily employed in tinware, cutlery and tools, hardware, forging, foundry, nut and bolt, spring, and related metal fabricating establishments. Ordnance is classified in Group 370. Machinery is classified in Groups 560 & 570, and 580. Transportation equipment is classified in Group 590. Other fabricated metal products are classified with those materials or products to which they are most closely related (professional, scientific, and controlling instruments; watches and clocks; jewelry and silverware; etc.)

551 Metal Cans and Containers (cans, barrels, drums, kegs, pails, etc.)

552 Cutlery, Handtools and General Hardware (cutlery, such as cleavers, clippers, knives, razors, scissors, and shears; handtools, such as axes, bits, chisels, mechanics' and carpenters' handtools, garden tools, and handsaws and saw blades; and hardware, such as builders' hardware, furniture hardware, and motor-vehicle hardware)

553 Nonelectric Heating Equipment, except Warm-Air Furnaces; and Plumbing Fixtures (enameled iron and metal sanitary ware; plumbing-fixture fittings and trim [brass goods]; and nonelectric heating equipment [except warm-air furnaces], such as gas, oil, or wood-burning heaters, steam or hot water domestic furnaces, radiators, and solar heaters)

554 Fabricated Structural Metal Products (fabricated structural metal; metal doors, sash, frames, molding, and trim; fabricated plate work [boiler-shops]; sheet-metal work; architectural and ornamental metal work, such as fire escapes, flagpoles, and lampposts; and prefabricated metal buildings and components)

555 Screw-Machine Products; and Bolts, Nuts, Screws, Rivets, and Washers

556 Metal Forgings and Stampings (ferrous and nonferrous forgings; and metal stampings, such as automotive stampings, bottle and jar caps and tops, ashtrays, garbage cans, helmets, license tags, and radio and television chassis)

557 Fabricated Wire Products (barbed wire; paper clips; and wire springs, fencing, screening, garment hangers, etc.)

559 Fabricated Metal Products, except Ordnance, Machinery, and Transportation Equipment, n.e.c. (steel springs; valves and pipe fittings [except plumbers']; metal foil and leaf; fabricated pipe; safes and vaults; etc.)

560 & 570 MACHINERY AND EQUIPMENT, EXCEPT ELECTRICAL

This group includes machinery and equipment, except electric, and portable electric and pneumatic powered tools manufactured or repaired by machine assemblers, installers, repairers, and related workers customarily employed in engine and turbine, forging, foundry, machine manufacturing, and related establishments. It encompasses printing type, plate, and rollers prepared (for use by printing-press operators) by lithographic platemakers, photoengravers, compositors, stenotypists, and related workers customarily employed in various printing and publishing establishments. Refer to corresponding SIC Groups in SIC Major Group 35 Machinery, Except Electrical, for a complete listing of machinery and equipment encompassed in the MPSMS categories listed below. Refer to SIC Group 355, Special Industry Machinery, Except Metalworking Machinery, for a complete listing of machinery and equipment encompassed in MPSMS category 567, Special Industrial Machinery. Electrical machinery, household appliances, and electric warm-air furnaces are classified in Group 580. Laboratory scales and balances are classified in Group 600. Transportation equipment is classified in Group 590.

561 Engines and Turbines (steam, hydraulic, and gas [except aircraft] turbines, steam engines [except locomotive], and turbine-generator and other internal-combustion engines and parts [except aircraft and nondiesel automotive])

562 Farm and Garden Machinery and Equipment (including farm and garden wheel tractors, and snow blowers and throwers)

563 Construction Machinery and Equipment (bulldozers, concrete mixers, nonindustrial plant cranes, dredging machinery, pavers, power shovels, etc.)

564 Mining and Oil-Field Machinery and Equipment (coal breakers, mine cars, core drills, coal cutters, portable rock drills, and mineral cleaning, concentration, and rock-crushing machinery; gas, oil, and water-well machinery and equipment; etc.)

565 Materials-Handling Machinery and Equipment (elevators and moving stairways; conveyors and conveying equipment; hoists, industrial cranes, and monorail systems; industrial trucks, tractors, trailers, and stackers; etc.)

566 Metalworking Machinery and Equipment (metal cutting and forming machine tools; special dies and tools, die sets, jigs and fixtures, and industrial molds; machine-tools accessories and measuring devices; power driven handtools; rolling mill machinery and equipment; welding equipment, automotive maintenance equipment; etc.)

567 Special Industrial Machinery (food products, textile, woodworking, paper industries, printing trades, etc., machinery and equipment)

568 General Industrial Machinery and Equipment (pumps and pumping equipment; ball and roller bearings; air and gas compressors; blowers and exhaust and

ventilating fans; industrial patterns; speed changers, industrial high-speed drives, and gears; industrial process furnaces and ovens; mechanical power-transmission equipment; etc.)

571 Office, Computing, and Accounting Machines (typewriters, electronic computing equipment; calculating and accounting machines; scales and balances [except laboratory]; and dictating, duplicating, and shorthand machines, etc.)

572 Service-Industry Machinery (automatic merchandising machines; commercial laundry, dry cleaning, and pressing machines; measuring and dispensing pumps; and car-washing machinery, commercial food-warming equipment, floor sanding, washing, and polishing machines, industrial vacuum cleaners, etc.)

573 Refrigeration and Air-Conditioning Equipment (commercial and industrial refrigeration equipment and systems; air-conditioning units; warm-air furnace [except electric]; soda fountain and beer-dispensing units; humidifiers and dehumidifiers [except room]; evaporative condensers [heat-transfer equipment]; etc.)

579 Machinery and Equipment, except Electrical, n.e.c. (carnival machines and equipment, sand riddles, catapults, etc.)

580 ELECTRICAL AND ELECTRONIC MACHINERY, EQUIPMENT, AND SUPPLIES

This group includes machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilization of electrical energy, and household appliances and lighting fixtures, as produced or repaired by workers customarily employed in electrical equipment, electronics, and related establishments. Electric measuring instruments and graphic-recording instruments are classified in Group 600.

581 Electric Transmission and Distribution Equipment (power, distribution, and specialty transformers, such as doorbell transformers, lighting fixture ballasts, line-voltage regulators, rectifier transformers, etc.; and switchgear and switchboard apparatus, such as power switches, circuit breakers, power-switching equipment, switchboards and cubicles, control and metering panels, power-fuse mountings and devices, etc.)

582 Electrical Industrial Apparatus (motors, generators, and parts [except starting motors], such as motor generator sets and railway motors and control equipment; industrial controls, such as motor starters, rheostats, and solenoid switches; electric welding apparatus; carbon and graphite products, such as brush blocks and electrodes; and battery chargers, blasting machines, fixed and variable capacitors, condensers, and rectifiers, etc.)

583 Household Appliances (household electric and nonelectric cooking equipment, such as stoves, ovens, and ranges; household refrigerators and home and farm freezers; household laundry equipment, including coin-operated washers and driers; electric housewares and fans, such as electric blankets, space heaters, blenders, broilers, toasters, knives, razors, toothbrushes, and household fans [except attic]; household vacuum cleaners; domestic and industrial sewing machines; and household dishwashers, floor waxers and polishers, garbage-disposal units, trash compactors, and water heaters)

584 Electric Lighting and Wiring Equipment (electric lamps, such as incandescent filament, vapor and fluorescent, and photoflash and photoflood; current-carrying wiring devices, such as attachment plugs and caps, convenience outlets, fluorescent starters, lamp sockets and receptacles, lightning arrestors and coils, and overhead trolley-line material; noncurrent-carrying wiring devices, such as conduits and fittings, electrical insulators and insulation material [except glass and porcelain], and boxes for junctions, outlets, switches, and fuses; residential, commercial, industrial, and institutional electric lighting fixtures; vehicular-lighting equipment; and other lighting equipment, such as flashlights, searchlights, lanterns, and lamp fixtures, including ultraviolet and infrared lamp fixtures)

585 Home-Entertainment Electric Equipment (radio- and television-receiving sets [except communication types], auto radios and tape players, public address systems, phonographs, home recorders, phonograph records, prerecorded magnetic tape, etc.)

586 Communication and Related Equipment (telephone and telegraph apparatus and parts; radio- and television-transmitting and signaling equipment, such as broadcasting and communication equipment and parts; detection equipment and apparatus, such as electronic-field-detection apparatus, light- and heat-emission-operating apparatus, object-detection apparatus [radar], navigational electronic equipment, electronic sighting and control equipment, and aircraft- and missile-control systems; and related equipment, such as laser systems and equipment, and railway, highway, and traffic signals)

587 Electronic Components and Accessories (radio and television receiving type electron tubes, including cathode-ray picture tubes; transmitting, industrial, and special-purpose electron tubes; semiconductors and related devices; electronic capacitors; resistors for electric applications; electronic coils, transformers, and other inductors; connectors for electronic applications; and other electronic components, such as receiving antennas, printed circuits, switches, and wave guides)

589 Electrical and Electronic Machinery, Equipment, and Supplies, n.e.c. (storage batteries; primary batteries, dry and wet; X-ray apparatus and tubes, and electromedical and electrotherapeutic apparatus; electrical equipment for internal combustion engines, including armatures, starting motors, alternators, and

generators for automobile and aircraft, spark plugs, magnetos, coils, distributors, and high-frequency ignition systems; electron-beam metal-cutting, forming, and welding machines, ultrasonic cleaning and welding machines; and appliance and extension cords, Christmas-tree-lighting sets, electric bells and chimes, electric-fireplace logs, and electric-warm-air furnaces)

590 TRANSPORTATION EQUIPMENT

This group includes motor vehicles, aircraft, space vehicles, ships, boats, railroad equipment, motorcycles, bicycles, and other transportation equipment as produced, maintained, and repaired by workers customarily employed in aircraft-aerospace, automobile manufacturing, motorcycle and bicycle, locomotive and car building and repair, ship and boat building and repair, and related transportation equipment and service establishments. Wheel tractors, tracklaying and off-highway contractors' tractors, and industrial materials handling machinery and equipment are classified in Group 560 & 570. Mobile homes are classified in Group 450. Tires and tubes and rubber boats are classified in Group 510. Diesel and semi-diesel engines and electrical systems for internal-combustion engines are classified in Groups 560 & 570 and 580 respectively.

591 Motor Vehicles and Motor-Vehicle Equipment (motor vehicles; passenger car bodies; truck and bus bodies; motor-vehicle parts and accessories including engines and parts [except diesel]; truck trailers; and motor homes)

592 Aircraft and Parts (aircraft; aircraft engines and parts; and other aircraft parts and accessories, such as aircraft bodies, deicing equipment, landing gear, propellers, etc.)

593 Ships and Boats (barges, cargo vessels, combat vessels, hydrofoil vessels, lighters, tankers, tugboats, etc.; and boat kits and boats [except rubber])

594 Railroad Equipment (locomotives and locomotive frames, engines, and parts; railroad, street, and rapid-transit cars and car equipment; and trackless trolleys)

595 Motorcycles, Bicycles, and Parts

596 Space Vehicles and Parts (including propulsion units)

597 Travel Trailers and Campers

598 Military Tanks and Tank Components

599 Transportation Equipment, n.e.c. (all terrain vehicles [ATV], golfcarts, pushcarts, snowmobiles, wheelbarrows, etc.)

600 MEASURING, ANALYZING, AND CONTROLLING INSTRUMENTS; PHOTOGRAPHIC, MEDICAL, AND OPTICAL GOODS; AND WATCHES AND CLOCKS

This group includes measuring, testing, analyzing, and controlling instruments and associated sensors and accessories; optical instruments and lenses; surveying and drafting instruments; surgical, medical, and dental instruments, equipment, and supplies; ophthalmic goods; photographic equipment and supplies; and watches and clocks; as manufactured and repaired by workers customarily employed in balances and scales, clock and watch, electrical equipment, electronics, instruments and apparatus, optical goods, photographic apparatus and materials, and related establishments. Balances and scales, other than laboratory, and machinists' precision-measuring tools are classified in Group 560 & 570.

601 Engineering, Laboratory, Scientific, and Research Instruments and Equipment (nautical, navigational, aeronautical, surveying, and drafting instruments; and instruments for laboratory work and scientific research [except optical instruments])

602 Measuring and Controlling Instruments (residential- and commercial-environment-regulating controls; household-appliance-regulating controls; measurement, display, and control instruments for industrial-process variables; totalizing-fluid-meters and counting devices, such as gasmeters, watermeters, speedometers, and taximeters; electricity and electrical-signal measuring and testing instruments such as ammeters, voltmeters, and diode and transistor testers; and physical-property-testing-apparatus, nuclear instruments, aircraft-engine instruments, etc.)

603 Optical Instruments and Lenses (lenses, prisms, microscopes, telescopes, field and opera glasses, and optical sighting and fire control, measuring, and testing instruments and equipment, such as telescopic sights, wind and percentage correctors, refractometers, spectometers, spectroscopes, colorimeters, polariscopes, etc.)

604 Surgical, Medical, and Dental Instruments and Supplies (medical, surgical, ophthalmic, and veterinary instruments and apparatus; orthopedic, prosthetic, and surgical appliances, arch supports, and other foot appliances; fracture appliances, elastic hosiery, and abdominal supporters, braces, and trusses; bandages; surgical gauze and dressings; sutures; adhesive tapes and medicated plasters; personal safety appliances and equipment; and dental equipment, supplies, and instruments, such as artificial teeth, dental metals, alloys and amalgams, and dental drills, forceps, pliers, etc.)

605 Ophthalmic Goods (ophthalmic frames, lenses, sunglass lenses, contact lenses, etc.)

606 Photographic Equipment and Supplies (still and motion picture cameras and projection apparatus; photocopy and microfilm equipment; blueprinting and

diazotype [white printing] apparatus and equipment; sensitized film, paper, cloth, and plates; and prepared photographic chemicals)

607 Watches, Clocks, Clockwork-Operated Devices, and Parts (mechanical and electric clocks, watches, mechanisms for clockwork-operated devices, clock and watch parts, watchcases, appliance timers, etc.)

610 MISCELLANEOUS FABRICATED PRODUCTS

This group includes jewelry; silverware, plated wire, and stainless steelware; musical instruments; games and toys; sporting and athletic goods; pens, pencils, and other office and artists' materials; costume jewelry and novelties, buttons, and miscellaneous notions; brooms and brushes; caskets; and other miscellaneous products as manufactured by workers customarily employed in a wide variety of establishments. Bicycles are classified in Group 590. Athletic apparel is classified in Group 440. Firearms are classified in Group 370. Drafting instruments are classified in Group 600. Glass novelties are classified in Group 530. Rubber floor coverings and cork floor and wall tile are classified in Group 510 and 450 respectively.

611 Jewelry, Precious Metal (precious metal jewelry [with or without stones], umbrella and cane trimmings, and jewel settings and mountings)

612 Silverware, Plated Ware, and Stainless Steel Ware (flatware, hollowware, ecclesiastical ware, trophies, etc.)

613 Jewelers' Findings and Materials; and Lapidary Work (jewelers' findings and materials; and cut and polished real and synthetic jewels for settings, bearings, phonograph-needle points, etc.)

614 Musical Instruments and Parts (pianos, organs, violins, musical-instrument strings, etc.)

615 Games and Toys (dolls; chess sets; toy-air rifles; children's vehicles [except bicycles], including baby carriages and strollers; etc.)

616 Sporting and Athletic Goods, except Firearms and Apparel (fishing tackle; golf and tennis goods; baseball, football, basketball, and boxing equipment; billiard and pool tables and equipment; roller skates and ice skates; gymnasium and playground equipment; bowling-alley equipment and accessories; etc.)

617 Pens, Pencils, and Other Office and Artists' Materials (pens, soft-tipped markers, mechanical pencils, and parts; lead pencils, crayons, and artists' materials [except drafting instruments]; marking devices, such as inking pads, steel letters and figures, stencils, and hand stamps, dies, and seals; and carbon paper and inked ribbons)

618 Costume Jewelry and Novelties, Buttons, and Notions (costume jewelry, novelties, and ornaments; feathers, plumes, and artificial trees, flowers, fruits, and foliage [except glass]; buttons and button parts, blanks, and molds; and needles, pins, hooks and eyes, buckles, slide and snap fasteners, etc.)

619 Miscellaneous Fabricated Products, n.e.c. (brooms, brushes, and paint rollers; signs and advertising displays, including neon signs and advertising novelties; burial caskets, casket linings, and burial vaults [except concrete]; hard-surface floor covering [except rubber and cork]; and candles, cigarette holders and smoking pipes, coin-operated-amusement machines, embroidery kits, fire extinguishers, globes, mannequins, matches, canes, umbrellas, etc.)

SUBJECT MATTER

700 & 710 ARCHITECTURE AND ENGINEERING

This group includes subject matter dealing with the practical application of physical laws and principles of engineering and architecture for the development and utilization of machines, materials, instruments, structures, processes, and services. It encompasses those professional and kindred occupations dealing with or applying engineering or architectural principles and techniques in specialized areas, such as research, design, construction, testing, procurement, production, operations, and sales.

701 Architectural Engineering (including floating structures)

702 Aeronautical Engineering

703 Electrical, Electronic Engineering

704 Civil Engineering (including sanitary and environmental health)

705 Ceramic Engineering

706 Mechanical Engineering (including heating, ventilating, air conditioning, refrigerating, and automotive engineering)

707 Chemical Engineering

708 Mining and Petroleum Engineering

711 Metallurgical Engineering

712 Industrial Engineering (methods, production, and safety engineering; cost and quality control; time, motion, and incentive studies; plant layout; etc.)

713 Agricultural Engineering (machine and structure design and development; soil and water conservation; pest control; etc.)

714 Marine Engineering (design, development, and installation of ship machinery and related equipment)

715 Nuclear Engineering

716 Surveying, Cartographic (photogrammetry, topography, mapping, etc.)

719 Architecture and Engineering, n.e.c. (pollution control, ordnance, optical, biomedical, photographic, logistics, laser, and packaging engineering, etc.)

720 MATHEMATICS AND PHYSICAL SCIENCES

This group includes subject matter dealing with research pertaining to the physical universe, and the application of established mathematical and scientific laws and principles to specific problems and situations. It encompasses mathematicians, computer programers, astronomers, chemists, physicists, geologists, geophysicists, geodesists, and related professional and kindred occupations.

721 Mathematics (actuarial, operations research, computer applications, etc.)

722 Astronomy

723 Chemistry (organic, inorganic, physical, analytical, etc. [excluding biochemistry])

724 Physics (excluding biophysics)

725 Geology and Geophysics (mineralogy, paleontology, petrology, meteorology, seismology, hydrology, oceanography, etc.)

729 Mathematics and Physical Sciences, n.e.c. (geography, pollution control, environmental research, etc.)

730 LIFE SCIENCES

This group includes subject matter dealing with research to increase basic knowledge of living organisms, including humans, and the practical application of biological and behavioral theories. It includes agronomists, horticulturists, anatomists, biologists, biochemists, biophysicists, botanists, psychologists, and related professional and kindred workers.

731 Agriculture, Horticulture, and Forestry (animal husbandry, agronomy, soil science, forestry and conservation, etc.)

732 Biological Sciences (anatomy, biology, genetics, pharmacology, physiology, bacteriology, pathology, biochemistry, biophysics, etc.)

733 Psychology (includes counseling)

739 Life Sciences, n.e.c.

740 SOCIAL SCIENCES

This group includes subject matter dealing with human society and its characteristic elements, such as origin, race, or state; and with economic and social relations and institutions involved in man's existence as a member of an organized community. It includes economists, political scientists, biographers, historians, sociologists, anthropologists, archeologists, philologists, linguists, and related professional and kindred workers. Occupations in social work are classified in Group 940.

741 Economics

742 Political Science

743 History

744 Sociology (includes criminology)

745 Anthropology (archeology, ethnology, ethnography)

749 Social Sciences, n.e.c. (philology, linguistics, etc.)

750 ARTS AND LITERATURE

This group includes subject matter dealing with the integration of personal expression and artistic or literary concepts, techniques, or processes to create, perform, conduct, or edit artistic or literary works or activities which elicit an emotional or esthetic response. It includes landscape painters, sculptors, illustrators, cartoonists, furniture designers, interior designers, motion-picture photographers, actors, dancers, musicians, composers, writers, editors, and related professional and kindred occupations. Commercial decorating, window trimming, and modeling services are classified in Group 880. Photofinishing services are classified in Group 890.

751 Fine Arts (creative art, such as painting and sculpturing)

752 Graphic Arts (commercial art, such as designing, drawing, and illustrating)

753 Photography (still and motion-picture photography)

754 Dramatics

755 Rhythmics (dancing)

756 Music

757 Literature and Journalism

759 Arts, n.e.c.

SERVICES

850 TRANSPORTATION SERVICES

This group includes railroad, motor-vehicle, water, air, and pipeline transportation services provided by locomotive engineers, conductors, bus and truck drivers, ship and airline pilots, stevedores, deckhands, transportation agents, pumpstation operators, pipeline laborers, and related workers customarily employed in various transportation and pipeline establishments. Maintenance and repair services are classified in Group 590. Automobile services other than maintenance and repair are classified in Group 960. Natural, liquefied-petroleum [LP], manufactured, and mixed gas production and distribution services are classified in Group 870. Ambulance services are classified in Group 920.

851 Interurban Railroad Transportation (railroad line-haul, switching, and terminal, etc.)

852 Local and Suburban Transit and Interurban Highway Passenger Transportation (subway, trolley coach, street railway, and aerial tramway; bus line, charter and terminal; taxicab; school bus; etc.)

853 Motor Freight Transportation and Warehousing (local and long-distance trucking; trucking terminal; public warehousing and storage)

854 Water Transportation (deep sea and inland waterway transportation; lighterage, towing, and tugboat; taxi, excursion, and sightseeing boat; marine-cargo handling; canal; etc.)

855 Air Transportation (air cargo and passenger transportation; airport terminal; etc.)

856 Pipeline Transportation (except natural gas)

859 Transportation Services, n.e.c. (freight forwarding; freight, travel, and tourist agency; highway bridge, toll bridge, toll road, and tunnel; stockyard; etc.)

860 COMMUNICATION SERVICES

This group includes aural or visual communication and broadcasting services provided by telephone and telegraph operators, radio and television broadcasters, radar-station operators, telephoto operators, and related workers customarily employed in radio- and television-broadcasting stations, telephone and telegraph companies, and related establishments. Newspapers, magazines, and related printed and published products are classified in Group 480. Telephone message services are classified in Group 890. Lecturing and public-speaking services are classified in Group 930. Installation, maintenance, and repair of communication structures and equipment are classified in Group 360 and 580 respectively.

861 Telephone Communication (wire or radio)

862 Telegraph Communication (wire or radio)

863 Radio Broadcasting

864 Television Broadcasting

869 Communication Services, n.e.c. (cablevision, missile tracking and radar, telephoto, ticker tape, etc.)

870 ELECTRIC, GAS, AND SANITARY SERVICES

This group includes electric, gas, and steam generation, transmission, and distribution services, and water supply, irrigation, and sanitary services, provided by substation operators, power-plant operators, meter readers, gas-pumping station operators, watershed tenders, wastewater-treatment plant operators, sludge-control operators, and related workers customarily employed in light, heat, and power, waterworks, and sanitary-services establishments. Installation, maintenance, and repair of electric, gas, and sanitary service structures and equipment are classified in Groups 360, 560 & 570, 580, and 600.

871 Electric Services (includes nuclear-generating)

872 Gas Production and Distribution (natural, manufactured, mixed, and liquefied-petroleum [LP] gas)

873 Water-Supply and Irrigation Services

874 Sanitary Services (sewerage, refuse, street cleaning)

875 Steam Supply (includes heated and cooled air)

880 MERCHANDISING SERVICES

This group includes retail and wholesale trade, route sales and delivery, auctioneering, vending, rental, sales promotion, merchandise displaying, and related merchandising services rendered by commodity-sales personnel, vendors, peddlers, newspaper carriers, sales-route drivers, auctioneers, rental clerks, cashiers, demonstrators, models, window dressers, commercial decorators, professional shoppers, buyers, and similar workers employed primarily in retail and wholesale trade establishments. Sales personnel engaged in selling finance, insurance, real estate, transportation, utilities, advertising, and related services are classified according to the services being sold.

881 Retail Trade

882 Wholesale Trade

883 Route Sales and Delivery Services (including coin-machine collecting)

884 Auctioneering, Vending, and Rental Services

885 Sales Promotion Services (demonstrating, modeling, etc.)

889 Merchandising Services, n.e.c. (commercial decorating, window trimming, professional shopping, etc.)

890 GENERAL BUSINESS, FINANCE, INSURANCE, AND REAL ESTATE SERVICES

This group includes insurance and real estate services, and clerical, accounting, general administration, financial, advertising, photofinishing and similar business services of a general nature rendered by various clerical workers, accountants, auditors, personnel officers, plant managers, bank officials, insurance and real estate agents, stockbrokers, public relations representatives, photofinishers, divers, sign painters, and related workers primarily employed in financial institutions, insurance, real estate, business services, and photofinishing establishments. Specialized business services, such as transportation, communication, public utility, merchandising, medical, legal, government, etc., are classified in their respective service groups.

891 Clerical Services, except Bookkeeping (stenographic, secretarial, typing, filing, duplicating, etc.)

892 Accounting, Auditing, and Bookkeeping Services

893 General Administration and Administrative Specialties (general management, personnel administration, job evaluation, consulting, computer programing, data processing, etc.)

894 Financial Services (banking, credit, collection, savings and loan, investment, trust, securities and commodities, etc.)

895 Insurance and Real Estate

896 Advertising and Public Relations Services

897 Blueprinting, Photocopying, and Photofinishing Services

898 Production Services (stock chasing, timekeeping)

899 General Business Services, n.e.c. (telephone message, news reporting, press clipping, trading stamp, commercial-testing laboratory, bail bonding, commercial diving, messenger, sign painting and lettering, etc.)

900 DOMESTIC, BUILDING, AND PERSONAL SERVICES

This group includes private household, lodging, meal, beauty and barber, janitorial, laundry, funeral, steam bath, and related services provided by bartenders, cooks, chauffeurs, hair stylists, janitors, bellhops, maids, morticians, spa operators, waitresses, and related workers, customarily employed in hotel and restaurant, laundry, cleaning, dyeing, and pressing, personnel service, business service, and domestic-service establishments. Babysitting services in private homes are also included. Apparel and furnishings alteration and repair services are classified according to the product altered or repaired. Nondomestic child and adult care services without accompanying medical care are classified in Group 940; medical-care services are classified in Group 920.

901 Domestic Services (babysitting, maid, chauffeuring, gardening, etc.)

902 Lodging Services (hotel, rooming house, camp, trailer park, etc.)

903 Meal Services, except Domestic (food, beverage, and catering)

904 Beauty and Barbering Services

905 Janitorial and Portering Services (building cleaning, baggage handling, window cleaning, chimney cleaning, floor waxing, etc.)

906 Apparel and Furnishings Services (laundry, dry cleaning, pressing, dyeing, linen and diaper supply, shoeshine, garment storage, etc.)

907 Funeral and Crematory Services

909 Domestic, Building, and Personal Services, n.e.c. (clothing rental, dating and escort, health spa, massage, steam bath, etc.)

910 AMUSEMENT AND RECREATION SERVICES

This group includes motion picture, theater, sports, and related entertainment services provided by movie producers, directors, projectionists, extras, propmakers, high riggers, athletes, athletic coaches and trainers, animal trainers, caddies, concession attendants, gambling-hall attendants, ushers, wardrobe attendants, ride operators, and related workers customarily employed in amusement and recreation, motion picture, and radio and television broadcasting establishments. Dramatics, dancing, and music instructors and professional performers are classified in Groups 930 and 750 respectively.

911 Motion Picture Services (production and distribution; casting and directing; film editing, developing, printing, and rental; ushering and ticket taking; etc.)

912 Theater Services (production; casting; booking; costume and scenery design; lighting; ticket agency; ushering and ticket taking; etc.)

913 Sports Participation (includes athletes, trainers, coaches, etc.)

914 Sports Services (billiard parlor, bowling alley, golf club, racetrack, equipment rental, etc.)

919 Amusement and Recreation Services, n.e.c (dancehall, ballroom, amusement arcade, amusement park, carnival, gambling, tourist guide, zoological garden, etc.)

920 MEDICAL AND OTHER HEALTH SERVICES

This group includes medical and other health services provided to others by physicians, dentists, osteopaths, optometrists, podiatrists, nurses, therapists, dieticians, medical-laboratory technicians, dental hygienists, dental assistants, medical assistants, nurse aides, orderlies, and related workers employed in medical service establishments. Ambulance and veterinary services are also included.

921 Physician Services, including Surgical

922 Dental Services, including Surgical

923 Optometric, Chiropractic, and Related Services

924 Nursing, Dietetic, and Therapeutic Services

925 Health Technological Services (clinical laboratory, dental hygiene, radiological, etc.)

926 Medical Assistant, Aide, and Attendant Services

929 Medical and Other Health Services, n.e.c. (ambulance, veterinary, etc.)

930 EDUCATIONAL, LEGAL, MUSEUM, LIBRARY, AND ARCHIVAL SERVICES

This group includes educational, legal, museum, library, and archival services provided by teachers, professors, instructors, home economists, lecturers, lawyers, judges, librarians, archivists, museum curators, and related workers customarily employed in education, legal, museum, and library establishments. Animal trainers and coaches and trainers of professional athletes are classified in Group 910.

931 Educational Services (includes vocational training, farm and home advising, and lecturing services)

932 Legal Services

933 Museum, Library, and Archival Services

940 SOCIAL, EMPLOYMENT, AND SPIRITUAL SERVICES

This group includes services rendered to individuals and groups with employment, spiritual, child- or adult-care needs, or social problems, such as poverty, family maladjustment, antisocial behavior, financial mismanagement, or inadequate housing. It encompasses employment interviewers and clerks, personnel recruiters, clergy members, nursery school attendants, companions, caseworkers, social workers, parole and probation officers, and related professional and social-service occupations. Psychological and counseling services to provide social, behavioral, educational, or vocational guidance are classified in Group 730. Educational services are classified in Group 930. Domestic babysitting services are classified in Group 900.

941 Social and Welfare Services (adoption, disaster, family location, homemaking, old-age assistance, refugee, travelers' aid, etc.)

942 Child and Adult Residential and Day-Care Services (nursery school, foster home, orphanage, rest home, training school, etc.)

943 Employment Services (recruitment, interviewing, and placement)

944 Spiritual Services (ministerial)

949 Social, Employment, and Spiritual Services, n.e.c. (parole, probation, etc.)

950 GOVERNMENT AND RELATED SERVICES

This group includes services concerned with government and related activities, such as fire and police protection, military services, food and drug inspection, customs control, tax collection, and postal services, that are usually confined to government and are not covered by other designations. It encompasses police officers, fire chiefs, jailers, bailiffs, camouflage specialists, field-artillery crewmembers, customs inspectors, food and drug inspectors, immigration inspectors, postmasters, post-office clerks, and related government and military services occupations.

951 Protective Services, except Military (property security, armored car services, crime correction, fire and police protection, wildlife protection, etc.)

952 Military Services

953 Regulatory Law Investigation and Control Services (customs, immigration, internal revenue, food and drug, safety and health, environmental and housing, licensing, etc.)

954 Postal Services

959 Government and Related Services, n.e.c.

960 **MISCELLANEOUS SERVICES**

This group includes motor-vehicle, deodorizing, exterminating, decontaminating, elevator, taxidermy, and other miscellaneous services provided by parking-lot attendants, tow-truck operators, car-wash attendants, exterminators, fumigators, air-purifier servicers, decontaminators, elevator operators, taxidermists, and related workers customarily employed in auto services and business services establishments. Motor-vehicle maintenance and repair services are classified in Group 590. Messenger and advertising services are classified in Group 890.

961 Motor-Vehicle Services, except Maintenance and Repair (parking, storage, towing, undercoating, washing, etc.)

962 Deodorizing, Exterminating, and Decontaminating Services

969 Miscellaneous Services, n.e.c. (elevator; gardening, groundskeeping, and landscaping; taxidermy; etc.)

Alphabetical Listing of MPSMS

A

604	Abdominal Braces, Supporters, and Trusses
538	Abrasive Products
486	Account Books
571	Accounting Machines
892	Accounting Services
721	Actuarial Mathematics
499	Adhesives
604	Adhesive Tapes
893	Administration and Administrative Specialty Services
941	Adoption Services
942	Adult Day- and Residential-Care Services
619	Advertising Displays and Novelties
896	Advertising Services
931	Advising Services, Farm and Home
852	Aerial Tramway Transportation Services
702	Aeronautical Engineering
601	Aeronautical Instruments
497	Agricultural Chemicals
713	Agricultural Engineering
731	Agriculture Sciences
731	Agronomy
855	Air-Cargo-Transportation Services
568	Air Compressors
706	Air-Conditioning Engineering
573	Air-Conditioning and Refrigeration Equipment
573	Air-Conditioning Units
592	Aircraft and Parts
592	Aircraft Accessories
586	Aircraft-Control Systems
592	Aircraft-Deicing Equipment
602	Aircraft-Engine Instruments
592	Aircraft Engines and Parts
589	Aircraft Generators
371	Aircraft Guns
602	Aircraft Instruments
592	Aircraft Propellers
466	Aircraft Seats
514	Air-Line Hose
855	Air-Passenger-Transportation Services
362	Airports
855	Airport-Terminal Services
615	Air Rifles, Toy
855	Air-Transportation Services
486	Albums (Printed)
395	Alcoholic Beverages
496	Alcohols, Polyhydric
491	Alkalies
604	Alloys, Dental
599	All-Terrain Vehicles (ATV)
589	Alternators, Aircraft and Automobile
355	Aluminum Ores
543	Aluminum, Smelted and Refined
604	Amalgams, Dental
929	Ambulance Services
496	Amines, Acid and Polyhydric Alcohol
602	Ammeters
372	Ammunition, except Small Arms
374	Ammunition, Small Arms
493	Ampuls
910	AMUSEMENT AND RECREATION SERVICES
919	Amusement-Arcade Services
619	Amusement Machines, Coin-Operated
919	Amusement-Park Services
493	Analogous Products
723	Analytical Chemistry
600	ANALYZING INSTRUMENTS
732	Anatomy
381	Animal Feeds
731	Animal Husbandry
320	ANIMALS
325	Animals, Captive Fur-Bearing
329	Animals, Laboratory
329	Animals, Zoo
587	Antennas, Receiving
745	Anthropology
371	Antiaircraft Guns
359	Antimony Ore
440	APPAREL
906	Apparel and Furnishing Services
442	Apparel, Men's and Boys' Athletic
443	Apparel, Women's, Girls', and Infants' Athletic
589	Appliance Cords
602	Appliance-Regulating Controls, Household
604	Appliances, Foot, Fracture, and Surgical

583	Appliances, Household
607	Appliance Timers
519	Aprons, Rubber
745	Archeology
701	Architectural Engineering
554	Architectural Metal Work
700 & 710	ARCHITECTURE AND ENGINEERING
933	Archival Services
604	Arch Supports
589	Armatures, Aircraft and Automobile
951	Armored-Car Services
532	Art Glass
539	Art Goods, Plaster of Paris and Papier-Mache
432	Art Goods, Stamped
618	Artificial Flowers and Fruit
618	Artificial Foliage (except Grass)
434	Artificial Leather
604	Artificial Teeth
618	Artificial Trees
371	Artillery
617	Artist Materials (except Drafting Instruments)
432	Art Needlework
750	ARTS
751	Arts, Fine
752	Arts, Graphic
473	Asbestos Building Paper
538	Asbestos Products
349	Asbestos (Raw Mineral)
556	Ash Trays, Stamped Metal
473	Asphalt Board and Building Paper
349	Asphalt, Native
502	Asphalt-Paving Mixtures and Blocks
503	Asphalt Roofing Felts
722	Astronomy
913	Athletes
442	Athletic Apparel, Men's and Boys'
443	Athletic Apparel, Women's, Girls', and Infants'
362	Athletic Fields
616	Athletic Goods (except Firearms and Apparel)
522	Athletic Shoes
489	Atlases
524	Attache Cases
584	Attachment-Wiring Caps and Plugs
884	Auctioneering Services
892	Auditing Services
572	Automatic Merchandising Machines
589	Automobile Generators
961	Automobile-Parking and Storage Services
466	Automobile Seats
961	Automobile Services, except Maintenance and Repair
556	Automobile Stampings
961	Automobile-Towing Services
961	Automobile-Undercoating Services
961	Automobile-Washing Services
706	Automotive Engineering
566	Automotive-Maintenance Equipment
585	Auto Radios and Tape Players
436	Awnings, Canvas
519	Awnings, Plastic
552	Axes

B

615	Baby Carriages and Strollers
387	Baby Foods, Canned
901	Babysitting Services
493	Bacterial Vaccines
732	Bacteriology
905	Baggage-Handling Services
474	Bags, Paper
439	Bags, Sleeping
436	Bags, Textile
899	Bail-Bonding Services
384	Bakery Products
399	Baking Powder
571	Balances (except Laboratory)
581	Ballasts, Lighting Fixture
568	Ball Bearings
519	Balloons, Rubber
919	Ballroom Services
549	Balls, Steel
319	Balsam Needles
604	Bandages
894	Banking Services
557	Barbed Wire
904	Barbering Services
469	Barber-Shop Equipment
593	Barges
347	Barite
319	Barks
551	Barrels, Metal
541	Bars and Rods, Iron and Steel
544	Bars and Rods, Nonferrous Metal
616	Baseball Equipment
616	Baketball Equipment

519	Bathing Caps, Rubber
442	Bathing Suits, Men's and Boys' (non-rubber)
519	Bathing Suits, Rubber
443	Bathing Suits, Womens', Girls' and Infants' (non-rubber)
589	Batteries, Primary, Dry and Wet
589	Batteries, Storage
582	Battery Chargers
433	Batting
355	Bauxite Ore
379	Bazookas
568	Bearings, Ball and Roller
613	Bearings, Cut and Polished Jewel
904	Beauty Services
469	Beauty-Shop Equipment
464	Beds, Sofa and Chair
435	Bedspreads
464	Bedsprings
573	Beer-Dispensing Units
329	Bees
392	Beet Sugar
589	Bells, Electric
529	Belting, Leather
514	Belting, Rubber and Plastic
449	Belts, Apparel
514	Belts, Conveyor
346	Bentonite
305	Berries
359	Beryllium Ore
395	Beverages, Alcoholic
903	Beverage Services
395	Beverages, Malt
595	Bicycles and Parts
525	Billfolds
914	Billiard-Parlor Services
616	Billiard Tables and Equipment
486	Binders, Looseleaf
732	Biochemistry
493	Biological Products
732	Biological Sciences
732	Biology
719	Biomedical Engineering
732	Biophysics
552	Bits
486	Blankbooks
583	Blankets, Electric
435	Blankets (except Electric)
541	Blast-Furnace Products
582	Blasting Machines
395	Blended Liquors
583	Blenders (Household)
469	Blinds, Window
536	Block, Concrete
493	Blood Derivatives
443	Blouses
568	Blower Fans
562	Blowers, Snow
531	Blown Glass and Glassware
606	Blueprinting Apparatus and Equipment
897	Blueprinting Services
593	Boat Kits
854	Boat Services, Excursion, Sightseeing, and Taxi
593	Boats, except Rubber
519	Boats, Rubber
592	Bodies, Aircraft
591	Bodies, Truck
555	Bolts, Metal
451	Bolts, Wood
372	Bombs
466	Bookcases, Metal
465	Bookcases, Wood
912	Booking Services, Theater
892	Bookkeeping Services
483	Books and Pamphlets
486	Books, Account, Receipt, and Sample
522	Boot and Shoe Cut Stock and Findings
467	Booths, Telephone
522	Boots, Canvas
347	Borate
493	Botanical Products
556	Bottle and Jar Caps and Tops
531	Bottles, Glass
519	Bottles, Plastic
616	Bowling-Alley Equipment and Accessories
914	Bowling-Alley Services
475	Boxes and Containers, Paperboard
616	Boxing Equipment
604	Braces, Abdominal
538	Brake Linings (Asbestos)
553	Brass Goods, Plumbing
444	Brassieres
564	Breakers, Coal
365	Breakwaters
534	Brick, Clay
536	Brick, Concrete
363	Bridges
859	Bridge Services, Highway
362	Bridle Paths
504	Briquettes, Fuel
586	Broadcasting Equipment and Parts

863	Broadcasting Services, Radio
864	Broadcasting Services, Television
421	Broad Woven Cotton Fabrics
422	Broad Woven Wool Fabrics
583	Broilers (Household)
344	Broken and Crushed Stone
619	Brooms
582	Brush Blocks (Carbon and Graphite)
619	Brushes
618	Buckles
538	Buffing Wheels
552	Builders' Hardware
905	Building-Cleaning Services
538	Building Materials (Asbestos)
473	Building Paper and Building Board, Nonconverted
900	BUILDING SERVICES
361	Buildings, except Prefabricated
554	Buildings, Prefabricated Metal
455	Buildings, Prefabricated Wood
537	Building Stone
584	Bulbs, Electric Light
311	Bulbs, Plant
563	Bulldozers
619	Burial Caskets
619	Burial Vaults, except Concrete
890	BUSINESS SERVICES, GENERAL
484	Business Forms
852	Bus-Line Services, Charter
852	Bus-Line Services, Terminal
618	Button Blanks and Molds
618	Buttons and Parts

C

467	Cabinets, Display
466	Cabinets, Filing (Metal)
467	Cabinets, Kitchen
461	Cabinets, Phonograph, Radio, Sewing Machine, and Television
364	Cable Lines
544	Cable, Nonferrous Metal
541	Cable, Steel
869	Cablevision Services
571	Calculating Machines
524	Camera Cases
606	Cameras, Motion Picture
606	Cameras, Still
597	Campers
902	Camp Services
365	Canals
854	Canal Services
619	Candles
393	Candy
619	Canes
392	Cane Sugar
611	Cane Trimmings
387	Canned Food Specialties
551	Cans, Metal
556	Cans, Stamped Metal
522	Canvas Boots
436	Canvas Products
582	Capacitors, Electrical (Fixed and Variable)
587	Capacitors, Electronic
584	Caps, Attachment Wiring
556	Caps, Bottle and Jar
519	Caps, Rubber Bathing
493	Capsules (Pharmaceutical Preparations)
591	Car Bodies, Passenger
396	Carbonated Waters
499	Carbon Black
617	Carbon Paper
582	Carbon Products
472	Cardboard (except Die Cut)
474	Cardboard, Die Cut
485	Cards, Greeting (except Hand-Painted)
579	Carnival Machines and Equipment
919	Carnival Services
552	Carpenters' Handtools
431	Carpets
615	Carriages, Baby
594	Cars and Equipment, Railroad
594	Cars and Equipment, Rapid Transit
564	Cars, Mining
716	Cartographic Engineering
572	Car-Washing Machinery
524	Cases, Attache, Camera, Musical Instrument
467	Cases, Display
525	Cases, Jewelry and Key
619	Casket Linings
619	Caskets, Burial
911	Casting Services, Motion Picture
912	Castings Services, Theater
542	Castings, Ferrous and Nonferrous Metal
542	Castings, Metal
489	Catalogs
579	Catapults
903	Catering Services
587	Cathode-Ray Picture Tubes
329	Cats

321	Cattle
533	Cement, Hydraulic (Natural, Portland, Masonry)
503	Cements, Roofing
705	Ceramic Engineering
534	Ceramic Wall and Floor Tile
464	Chair Beds
466	Chairs, Metal
465	Chalkboards, Wood
365	Channels
852	Charter-Bus-Line Services
556	Chassis, Radio and Television (Metal Stamped)
901	Chauffering Services
486	Checkbooks
490	CHEMICAL AND ALLIED PRODUCTS
347	Chemical and Fertilizer Minerals
707	Chemical Engineering
497	Chemicals, Agricultural
496	Chemicals, Gum and Wood
491	Chemicals, Inorganic
493	Chemicals, Medicinal
496	Chemicals, Organic
606	Chemicals, Photographic
496	Chemicals, Rubber Processing
496	Chemicals, Wood
496	Chemical Warfare Gases
372	Chemical Warfare Projectiles
723	Chemistry
723	Chemistry, Analytical
723	Chemistry, Inorganic
723	Chemistry, Organic
723	Chemistry, Physical
615	Chess Sets
393	Chewing Gum
403	Chewing Tobacco
942	Child Day-Care and Residential-Care Services
615	Children's Vehicles (except Bicycles)
589	Chimes, Electric
905	Chimney-Cleaning Services
535	China Plumbing Fixtures
535	Chinaware
923	Chiropractic Services
552	Chisels
491	Chlorine
393	Chocolate
589	Christmas-Tree Light Sets
313	Christmas Trees (Standing Timber)
356	Chromium Ore
398	Cider
619	Cigarette Holders
401	Cigarettes
402	Cigars
581	Circuit Breakers
304	Citrus Fruits
704	Civil Engineering
346	Clay
534	Clay, Brick
346	Clay, Fire
534	Clay, Firebrick
530	CLAY PRODUCTS
534	Clay Products, Structural and Heat-Resisting
534	Clay Tile, Drain, Roofing, and Sewer
534	Clay Tile, Structural
564	Cleaning Machinery, Mineral
589	Cleaning Machinery, Ultrasonic
495	Cleaners, Paintbrush
583	Cleaners, Vacuum (Household)
494	Cleaning Preparations
552	Cleavers
891	Clerical Services (except Bookkeeping)
925	Clerical Laboratory Services
552	Clippers
519	Cloaks, Rubber
600	CLOCKS AND WATCHES
607	Clocks and Parts
607	Clocks, Electric and Mechanical
607	Clockwork-Operated Mechanisms
607	Clockwork-Operated Services and Parts
583	Clothes Driers, Household and Coin Operated
519	Clothespins, Plastic
457	Clothespins, Wood
449	Clothing, Leather and Sheepskin Lined
909	Clothing, Rental Services
519	Clothing, Rubber
442	Clothing, Work
606	Cloth, Sensitized
913	Coaches, Athletic
341	Coal
564	Coal Breakers and Cutters
496	Coal Tar (Cyclic Crudes)
371	Coast Artillery
434	Coated Fabrics (except Rubber)
474	Coated Paper
503	Coatings, Roofing
447	Coats, Fur
441	Coats, Men's and Boys'
443	Coats, Women's, Girls', and Infants'
356	Cobalt Ore

393 Cocoa
391 Coffee
365 Cofferdams
584 Coils, Electrical
587 Coils, Electronic
584 Coils, Lightning
883 Coin-Machine Collecting Services
619 Coin-Operated Amusement Machines
583 Coin-Operated Clothes Driers
583 Coin-Operated Washing Machines
505 Coke
529 Collars, Dog
894 Collection Services
603 Colorimeters
519 Combs, Rubber
435 Comforters
482 Comics (Periodicals)
752 Commercial Art
361 Commercial Buildings
889 Commercial Decorating Services
899 Commercial Diving Services
602 Commercial Environmental-Regulating Controls
572 Commercial Food-Warming Equipment
572 Commercial Laundry Machinery
573 Commercial Refrigeration Equipment and Systems
899 Commercial Testing-Laboratory Services
364 Communication and Power Lines
586 Communication Equipment and Parts
860 COMMUNICATION SERVICES
862 Communication Services, Telegraph
861 Communication Services, Telephone
583 Compactors, Trash
491 Compounds, Inorganic
568 Compressors, Air and Gas
721 Computer Applications Mathematics
893 Computer-Programing Services
571 Computing Equipment, Electronic
571 Computing Machines
564 Concentration Machinery
536 Concrete Block, Brick, Pipe, and Furniture
536 Concrete, Gypsum, and Plaster Products
563 Concrete Mixers
536 Concrete, Ready Mixed
582 Condensers, Electrical (Fixed and Variable)
573 Condensers, Evaporative (Heat Transfer Equipment)
584 Conduits and Fittings (Electric)
393 Confectionary Products
587 Connectors, Electronic Application
731 Conservation
473 Construction Paper
563 Construction Machinery and Equipment
893 Consulting Services
605 Contact Lenses
475 Containers and Boxes, Paperboard
551 Containers, Metal
454 Containers, Wood
602 Control Instruments, Industrial Process Variables
600 CONTROLLING INSTRUMENTS
602 Controlling and Measuring Instruments
581 Control Panels
582 Controls, Industrial
586 Control Systems, Aircraft and Missile
584 Convenience Wiring Outlets
474 Converted Paper and Paperboard Products (except Containers and Boxes)
514 Conveyor Belts
565 Conveyors and Conveying Equipment
583 Cooking Equipment, Household
875 Cooled-Air Services
452 Cooperage Stock
352 Copper Ores
543 Copper, Smelted and Refined
413 Cordage
589 Cords, Appliance
589 Cords, Extension
564 Core Drills
459 Cork Products
474 Corrugated and Laminated Paper
494 Cosmetics
712 Cost-Control Engineering
912 Costume-Design Services
618 Costume Jewelry
467 Costumers
449 Costumes
302 Cotton Crops
421 Cotton Fabrics
733 Counseling
602 Counting Devices
565 Cranes, Industrial
563 Cranes, Nonindustrial Plant
617 Crayons

751	Creative Arts
894	Credit Services
907	Crematory Services
951	Crime-Correction Services
744	Criminology
439	Crocheted Products
539	Crucibles, Nonclay
342	Crude Petroleum
319	Crude Rubber
344	Crushed and Broken Stone
564	Crushing Machinery, Rock
581	Cubicles and Switchboards
435	Curtains
464	Cushions, Spring
953	Customs Services
532	Cut-Glass Tableware
552	Cutlery
522	Cut Stock and Findings, Boot and Shoe
537	Cut Stone
537	Cut Stone Furniture
564	Cutters, Coal
496	Cyclic (Coal Tar) Crudes
496	Cyclic Organic Intermediates

D

383	Dairy Products
365	Dams
919	Dancehall Services
755	Dancing
893	Data-Processing Services
305	Dates
393	Dates, Stuffed
909	Dating Services
942	Day-Care Services, Child and Adult
962	Decontaminating Services
889	Decorating Services, Commercial
854	Deep-Sea Transportation Services
573	Dehumidifiers (except Room)
592	Deicing Equipment, Aircraft
883	Delivery Services
885	Demonstrating Services (Sales Promotions)
604	Dental Equipment
925	Dental-Hygiene Services
604	Dental Instruments
604	Dental Metals, Alloys and Amalgams
922	Dental Services
604	Dental Supplies
922	Dental Surgical Services
962	Deodorizing Services
372	Depth Charges
912	Design, Costume
529	Desk Sets, Leather
466	Desks, Metal
465	Desks, Wood
586	Detection Equipment and Apparatus
494	Detergents
897	Developing Services, Film (Photofinishing)
911	Developing Services, Motion Picture Film
449	Diapers
906	Diaper-Supply Services
606	Diazotype (white printing) Apparatus and Equipment
571	Dictating Machines
474	Die-Cut Paper, Paperboard, and Cardboard
561	Diesel Engines and Parts (except Aircraft)
566	Die Sets
617	Dies, Hand
566	Dies, Special
924	Dietetic Services
365	Dikes
452	Dimension Stock, Hardwood
343	Dimension Stone
602	Diode Testers
911	Directing Services, Motion Picture
489	Directories
941	Disaster Services
435	Dishcloths
583	Dishwashers, Household
572	Dispensing Pumps
573	Dispensing Units, Beer
573	Dispensing Units, Soda Fountain
467	Display Cabinets and Cases
602	Display Instruments, Industrial Process Variables
619	Displays, Advertising
583	Disposal Units, Garbage
395	Distilled Liquors
581	Distribution Equipment, Electric
872	Distribution Services, Gas
911	Distribution Services, Motion Picture
581	Distribution Transformers
589	Distributors
899	Diving Services, Commercial
529	Dog Collars and Leashes
329	Dogs
615	Dolls
900	DOMESTIC, BUILDING, AND PERSONAL SERVICES

901	Domestic Services
583	Domestic Sewing Machines
554	Door and Window Frames, Metal
581	Doorbell Transformers
554	Doors, Metal
452	Doors, Wood
457	Dowels
519	Downspouts and Gutters, Plastic
601	Drafting Instruments
369	Drainage Systems
534	Drain Tile, Clay
754	Dramatics
435	Draperies
469	Drapery Hardware
563	Dredging Machinery
443	Dresses
449	Dressing Gowns
604	Dressings, Surgical
583	Driers (Household Laundry)
564	Drills, Core
604	Drills, Dental
564	Drills, Rock
953	Drug-Control Services
953	Drug-Regulatory-Law Investigation Services
493	Drugs
551	Drums, Metal
572	Dry-Cleaning Machinery
906	Dry-Cleaning Services
589	Dry Primary Batteries
571	Duplicating Machines
891	Duplicating Services
906	Dyeing Services
496	Dyes, Synthetic Organic

E

535	Earthenware
535	Earthenware Plumbing Fixtures and Fittings
612	Ecclesiastical Ware
741	Economics
911	Editing Services, Film
930	EDUCATIONAL, LEGAL, MUSEUM, LIBRARY, AND ARCHIVAL SERVICES
931	Educational Services
324	Eggs
382	Eggs, Processed
604	Elastic Hosiery
587	Electrical Applications Resistors
703	Electrical Engineering
581	Electrical Equipment Cubicles
584	Electrical Fittings
582	Electrical Industrial Apparatus
584	Electrical Insulators and Insulation Materials (except Glass and Porcelain)
584	Electrical Junction Boxes
580	ELECTRICAL MACHINERY, EQUIPMENT, AND SUPPLIES
584	Electrical Outlets
602	Electrical Signal-Measuring Instruments
535	Electrical Supplies, Porcelain
581	Electrical Switchboard Apparatus
584	Electrical Switches
581	Electrical Switchgear Apparatus
589	Electric Bells and Chimes
583	Electric Blankets
607	Electric Clocks
581	Electric Distribution Equipment
583	Electric Fans
589	Electric Fireplace Logs
870	ELECTRIC, GAS, AND SANITARY SERVICES
583	Electric Housewares
602	Electricity-Measuring-and-Testing Instruments
583	Electric Knives (Household)
584	Electric Lamps
584	Electric Lighting Equipment
584	Electric Lighting Fixtures
583	Electric Razors
871	Electric Services
583	Electric Toasters
583	Electric Toothbrushes
581	Electric-Transmission Equipment
589	Electric Warm-Air Furnaces
582	Electric Welding Apparatus
584	Electric Wiring Equipment
582	Electrodes (Carbon and Graphite)
589	Electromedical Apparatus
589	Electron-Beam Metal-Cutting, Forming, and Welding Machines
587	Electronic Application Connectors
587	Electronic Capacitors
587	Electronic Coils
587	Electronic Components and Accessories
571	Electronic Computing Equipment
703	Electronic Engineering
585	Electronic Equipment, Home Entertainment
586	Electronic Equipment, Navigational

586	Electronic Field-Detection Apparatus
586	Electronic Fire-Control Equipment
587	Electronic Inductors
580	ELECTRONIC MACHNERY, EQUIPMENT, AND SUPPLIES
586	Electronic Sighting Equipment
587	Electronic Switches
587	Electron Tubes, Industrial
587	Electron Tubes, Radio
587	Electron Tubes, Special Purpose
587	Electron Tubes, Television Receiving
587	Electron Tubes, Transmitting
589	Electrotherapeutic Apparatus
363	Elevated Highways
565	Elevators
969	Elevator Services
432	Embroideries
619	Embroidery Kits
943	Employment Services
553	Enameled Iron and Metal Sanitary Ware
495	Enamels
700 & 710	ENGINEERING
601	Engineering Instruments and Equipment
592	Engines, Aircraft
561	Engines and Parts, Diesel and Semi-Diesel
561	Engines and Parts, Internal Combustion (except Aircraft and Non-Diesel Automotive)
561	Engines and Turbines (except Aircraft and Non-Diesel Automotive)
591	Engines, Motor Vehicles (except Diesel)
561	Engines, Steam (except Locomotive)
561	Engines, Steam Locomotive
474	Envelopes
704	Environmental Health Engineering
602	Environmental Regulating Controls, Commercial and Residential
953	Environmental Regulatory Law Investigation and Control Services
729	Environmental Research
327	Equines
899	Equipment Rental-and-Leasing Services
519	Erasers, Rubber
909	Escort Services
496	Esters, Acid and Polyhydric Alcohol
745	Ethnography
745	Ethnology
573	Evaporative Condensers (Heat-Transfer Equipment)
854	Excursion-Boat Services
568	Exhaust Fans
499	Explosives
589	Extension Cords
962	Exterminating Services
394	Extracts, Flavoring
618	Eyes and Hooks

F

550	FABRICATED METAL PRODUCTS, EXCEPT ORDNANCE, MACHINERY, AND TRANSPORTATION EQUIPMENT
559	Fabricated Pipe, Metal
554	Fabricated Plate Work (Boiler Shops)
554	Fabricated Structural Metal
557	Fabricated Wire Products
420	FABRICS AND RELATED
421	Fabrics, Broad Woven Cotton
422	Fabrics, Broad Woven Wool
434	Fabrics, Coated (except Rubberized)
421	Fabrics, Glass Fiber
434	Fabrics, Impregnated (except Rubberized)
424	Fabrics, Knitted
425	Fabrics, Nonwoven (except Knitted)
519	Fabrics, Rubberized
421	Fabrics, Silk
421	Fabrics, Synthetic Fiber
941	Family Location Services
432	Fancy Textiles
484	Fanfold Forms
568	Fans, Industrial Blower
568	Fans, Industrial Exhaust and Ventilating
583	Fans, Household (except Attic)
931	Farm-Advising Services
361	Farm Buildings
300	FARM CROPS, PLANT
583	Farm Freezers
562	Farm Machinery and Equipment
562	Farm Wheel Tractors
618	Fasteners, Slide and Snap
385	Fats and Oils, Edible
618	Feathers
381	Feeds, Animal and Fowl
439	Felt Goods
503	Felts, Asphalt Roofing

422	Felt, Wool
451	Fence Rails
557	Fencing, Wire
356	Ferroalloy Ores
540	FERROUS METAL
542	Ferrous Metal Castings
347	Fertilizer and Chemical Minerals
497	Fertilizers
473	Fiberboard
468	Fiberglass Furniture and Fixtures
414	Fibers, Glass (Finishing)
531	Fibers, Glass (Production)
414	Fibers, Natural and Silk
414	Fiber Stock
414	Fibers, Synthetic (Finishing)
492	Fibers, Synthetic (Production)
410	FIBERS, TEXTILE
419	Fibers, Waste and Recovered
371	Field Artillery
302	Field Crops (except Grain)
603	Field Glasses
466	Filing Cabinets, Metal
891	Filing Services
495	Fillers, Wood
433	Filling, Upholstery
911	Film-Editing Services
606	Film Sensitized
894	Financial Services
522	Findings and Cut Stock, Boot and Shoe
613	Findings, Jewelers'
751	Fine Arts
331	Finfish
541	Finishing Mill Products
534	Firebrick, Clay
346	Fire Clay
586	Fire-Control Equipment, Electronic
603	Fire-Control Equipment, Optical
554	Fire Escapes, Metal
619	Fire Extinguishers
589	Fireplace Logs, Electric
951	Fire Protection Services
331	Fish (Finfish)
439	Fishing Nets
616	Fishing Tackle
332	Fish (Shellfish)
584	Fittings, Electric
559	Fittings, Metal Pipe (except Plumbers)
519	Fittings, Plastic Pipe
553	Fixture Fittings and Trim, Plumbing (Brass Goods)
535	Fixtures and Fittings, China and Earthenware Plumbing
460	FIXTURES AND FURNITURE
469	Fixtures and Furniture, Barber and Beauty Shop
468	Fixtures and Furniture, Plastic, Glass, and Fiberglass
469	Fixtures and Furniture, Rattan, Reed, Wicker, and Willow
584	Fixtures, Electric Lighting
467	Fixtures, Wood and Metal
554	Flagpoles, Metal
439	Flags
379	Flame Throwers
584	Flashlights
531	Flat Glass or Glassware
612	Flatware
394	Flavoring Extracts
496	Flavoring Materials, Synthetic
394	Flavoring Sirups
531	Float Glass
619	Floor Coverings, Hard-Surface (except Rubber and Cork)
452	Flooring
583	Floor Polishers (Household)
572	Floor-Polishing Machines (Commercial)
572	Floor-Sanding Machines (Commercial)
534	Floor Tile, Ceramic
572	Floor-Washing Machinery (Commercial)
583	Floor Waxers
905	Floor-Waxing Services
311	Floricultural Nursery Products
311	Florists' Greens
311	Flowers
618	Flowers, Artificial (except Glass)
311	Flower Seeds and Plants
602	Fluid Meters, Totalizing
584	Fluorescent Lamps
584	Fluorescent Starters
347	Fluorspar
559	Foil and Leaf, Metal
618	Foliage, Artificial (except Glass)
953	Food Control Services
567	Food Products Machinery and Equipment
903	Food Services
390	FOOD SPECIALTIES
380	FOOD STAPLES AND RELATED
572	Food-Warming Equipment, Commercial
604	Foot Appliances
616	Football Equipment

522	Footwear (except Rubber)
512	Footwear, Rubber and Plastic
604	Forceps, Dental
314	Forest Nursery Products
310	FOREST PRODUCTS
731	Forestry
310	FOREST TREES
556	Forgings, Metal
484	Forms, Business, Fanfold, and Office
942	Foster Home Services
324	Fowl
381	Fowl Feeds
604	Fracture Appliances
457	Frames, Mirror and Picture
605	Frames, Ophthalmic
554	Frames, Metal Window and Door
452	Frames, Wooden Window
583	Freezers, Home and Farm
859	Freight Agency Services
859	Freight Forwarding Services
339	Frogs
618	Fruit, Artificial (except Glass)
387	Fruits and Vegetables, Processed
304	Fruits, Citrus
305	Fruits (except Citrus)
504	Fuel Briquettes
501	Fuel, Jet
501	Fuel Oils
504	Fuel, Packaged and Powdered
340	FUELS, RAW
452	Fuelwood
346	Fuller's Earth
907	Funeral Services
325	Fur-Bearing Animals, Captive
447	Fur Coats and Jackets
447	Fur Goods
447	Fur Hats
589	Furnaces, Electric Warm-Air
369	Furnaces, Industrial (Constructed)
568	Furnaces, Industrial Process
553	Furnaces, Steam or Hot Water (Domestic)
573	Furnaces, Warm Air (except Electric)
447	Fur Neckpieces
442	Furnishings, Men's and Boys'
460	FURNITURE AND FIXTURES
469	Furniture and Fixtures, Barber and Beauty Shops
468	Furniture and Fixtures, Plastic, Glass, and Fiberglass
469	Furniture and Fixtures, Rattan, Reed, Wicker, and Willow
536	Furniture, Concrete
537	Furniture, Cut Stone
552	Furniture Hardware
463	Furniture, Metal Household
466	Furniture, Metal Office and Public Building
461	Furniture, Wood Household (except Upholstered)
462	Furniture, Wood Household (Upholstered)
465	Furniture, Wood Office and Public Building
521	Fur Pelts
447	Fur Trimmings
584	Fuse Boxes
581	Fuse Devices, Power
581	Fuse Mountings, Power

G

919	Gambling Services
326	Game and Wildlife
615	Games and Toys
556	Garbage Cans, Stamped Metal
583	Garbage Disposal Units
514	Garden Hose
969	Gardening Services, Commercial
901	Gardening Services, Domestic
562	Garden Machinery and Equipment
552	Garden Tools
562	Garden Wheel Tractors
557	Garment Hangers, Wire
906	Garment-Storage Services
449	Garters
553	Gas Burning Heaters
568	Gas Compressors
496	Gases, Chemical Warfare
491	Gases, Industrial
538	Gaskets (Asbestos)
364	Gas Mains
602	Gasmeters
342	Gas, Natural
501	Gasoline
872	Gas Production and Distribution Services
870	GAS SERVICES
872	Gas Services, Liquefied Petroleum (LP)
872	Gas Services, Manufactured

872	Gas Services, Mixed
872	Gas Services, Natural (Distribution)
561	Gas Turbine (except Aircraft)
564	Gas Well Machinery and Equipment
604	Gauze, Surgical
457	Gavels
568	Gears, Industrial
893	General Administration Services
890	GENERAL BUSINESS, FINANCE, INSURANCE, AND REAL ESTATE SERVICES
893	General Management Services
589	Generators, Aircraft and Automobile
582	Generators (except Aircraft and Automobile)
582	Generator Sets, Motor
561	Generator Set Units, Turbine
732	Genetics
725	Geology
729	Geography
725	Geophysics
319	Ginseng
444	Girdles
532	Glass, Art
531	Glass Bottles
603	Glasses, Opera
421	Glass-Fiber Fabrics
414	Glass Fibers (Finishing)
531	Glass Fibers (Production)
531	Glass, Float
468	Glass Furniture and Fixtures
532	Glass, Leaded, Stained, and Art
532	Glass, Mosaic
532	Glass Novelties
531	Glass or Glassware, Flat, Pressed, or Blown
531	Glass, Plate or Float
530	GLASS PRODUCTS
532	Glass Products Made of Purchased Glass
532	Glass, Stained
532	Glass Tableware, Cut
531	Glass Tableware, Pressed
531	Glassware, Flat, Pressed, or Blown
531	Glass, Window
474	Glazed Paper
619	Globes
523	Gloves and Mittens, Leather
449	Gloves, Dress and Work (except Rubber and All-Leather)
519	Gloves, Rubber
323	Goats
354	Gold and Silver Ores
599	Golfcarts
914	Golf Club (Sports Services)
616	Golf Goods
950	GOVERNMENT AND RELATED SERVICES
449	Gowns, Dressing
381	Grain Mill products
301	Grains
305	Grapes
752	Graphic Arts
582	Graphite Products
349	Graphite (Raw Mineral)
345	Gravel and Sand
485	Greeting Cards (except Hand-Painted)
372	Grenades
538	Grinding Wheels
532	Ground Glass
969	Groundskeeping Services
375	Guided Missiles
919	Guide Services, Tourist
496	Gum and Wood Chemicals
319	Gums (including Pine)
371	Guns, Howitzers, Mortars, and Related Equipment
519	Gutters and Downspouts, Plastic
616	Gymnasium Equipment
349	Gypsum
536	Gypsum Products

H

422	Haircloth
439	Hammocks
525	Handbags
617	Hand Dies
449	Handkerchiefs
552	Handsaws
617	Hand Seals
617	Hand Stamps
552	Handtools, Nonpower
566	Handtools, Power
439	Handwoven Products
557	Hangers, Wire Garment
365	Harbor Construction
552	Hardware, Builders'
469	Hardware, Drapery
552	Hardware, Furniture
552	Hardware, General
552	Hardware, Motor Vehicle
519	Hardware, Plastic

452 Hardwood Dimension Stock
529 Harness
445 Hats (except Fur)
447 Hats, Fur
432 Hatters' Fur
302 Hay (Crops)
953 Health-Control Services
387 Health Foods, Canned
920 HEALTH SERVICES
909 Health-Spa Services
925 Health-Technological Services
875 Heated-Air Services
586 Heat-Emission Operating Apparatus
514 Heater Hose
553 Heaters, Nonelectric
583 Heaters, Space and Water (Household)
706 Heating Engineering
553 Heating Equipment, Nonelectric
573 Heat-Transfer Equipment
556 Helmets, Metal
429 Hemp Fabrics
521 Hides
589 High-Frequency Ignition Systems
568 High-Speed Drives, Industrial
859 Highway Bridge Services
852 Highway Passenger-Transportation Services, Interurban
362 Highways and Streets
586 Highway Traffic Signals
743 History
322 Hogs
565 Hoists
612 Holloware
931 Home Advising Services
583 Home Freezers
941 Homemaking Services
585 Home Recorders
618 Hooks and Eyes
327 Horses
731 Horticulture
310 HORTICULTURAL SPECIALTIES, FOREST TREES, AND FOREST PRODUCTS
514 Hose, Air Line
514 Hose, Garden
514 Hose, Heater
514 Hose, Rubber and Plastic
446 Hosiery
604 Hosiery, Elastic
902 Hotel Services
553 Hot Water or Steam Domestic Furnaces
435 Housefurnishings
602 Household-Appliance-Regulating Controls
583 Household Appliances
583 Household Dishwashers
583 Household Fans (except Attic)
463 Household Furniture, Metal
462 Household Furniture, Upholstered Wood
461 Household Furniture, Wood (except upholstered)
583 Household Laundry Equipment
583 Household Ovens, Ranges, and Stoves
583 Household Refrigerators
583 Household Vacuum Cleaners
583 Household Water Heaters
583 Housewares, Electric
953 Housing-Control Services
371 Howitzers
536 Hydrated Lime
533 Hydraulic Cement
561 Hydraulic Turbines
366 Hydroelectric Powerplants
725 Hydrology
573 Humidifiers (except Room)

I

399 Ice
519 Ice Chests and Coolers, Plastic
616 Ice Skates
589 Ignition Systems, High Frequency
501 Illuminating Oils
953 Immigration Services
434 Impregnated Fabrics (except Rubberized)
584 Incandescent Filament Lamps
712 Incentive-Study Engineering
369 Incinerators
587 Inductors, Electronic
582 Industrial Apparatus, Electrical
582 Industrial Controls
587 Industrial Electron Tubes
712 Industrial Engineering
369 Industrial Furnaces (Constructed)
491 Industrial Gases
568 Industrial High-Speed Drives
567 Industrial Machinery and Equipment, Textile
567 Industrial Machinery and Equipment, Woodworking

568	Industrial Machinery, General
567	Industrial Machinery, Special
566	Industrial Molds
568	Industrial Patterns (Foundry Cores, etc.)
568	Industrial Process Furnaces
568	Industrial Process Ovens
602	Industrial Process Variables Control and Display Instruments
573	Industrial Refrigeration Equipment and Systems
583	Industrial Sewing Machines
565	Industrial Trucks
572	Industrial Vacuum Cleaners
584	Infrared-Lamp Fixtures
541	Ingots, Ferrous Metal
543	Ingots, Nonferrous Metal
617	Inked Ribbons
617	Inking Pads
499	Ink, Printing
854	Inland-Waterway Transportation Services
491	Inorganic Chemicals, Compounds, Pigments, and Salts
723	Inorganic Chemistry
601	Instruments, Aeronautical
602	Instruments, Aircraft Engine
600	INSTRUMENTS, ANALYZING
604	Instruments and Apparatus, Ophthlamic
604	Instruments and Apparatus, Veterinary
601	Instruments and Equipment, Engineering
601	Instruments and Equipment, Laboratory, Research, and Scientific
604	Instruments and Supplies, Dental, Medical, and Surgical
600	INSTRUMENTS, CONTROLLING
601	Instruments, Drafting
600	INSTRUMENTS, MEASURING
602	Instruments, Measuring and Controlling
601	Instruments, Nautical
601	Instruments, Navigational
602	Instruments, Nuclear
603	Instruments, Optical
601	Instruments, Scientific Research (except Optical)
601	Instruments, Surveying
538	Insulating Materials, (Asbestos)
473	Insulating Paper
584	Insulators and Insulation Materials, Electrical (except Glass and Porcelain)
895	Insurance Services
561	Internal Combustion Engines and Parts (except Aircraft and Non-Diesel Automotive)
589	Internal Combustion Engines' Electrical Equipment
852	Interurban Highway Passenger-Transportation Services
851	Interurban Railroad Transportation Services
943	Interviewing Services
953	Investigation and Control Services, Regulatory Law
894	Investment Services
541	Iron and Steel Basic Shapes (Bars, Pipes, Plates, Rods, etc.)
351	Iron Ores
549	Iron, Powdered
873	Irrigation Services
369	Irrigation Systems

J

447	Jackets, Fur
519	Jackets, Rubber Life
387	Jams
905	Janitorial Services
556	Jar and Bottle Caps and Tops
387	Jellies
501	Jet Fuels
613	Jewel Bearings
613	Jewelers' Findings
613	Jewelers' Materials
611	Jewelry
525	Jewelry Cases
618	Jewelry, Costume
611	Jewelry, Precious Metals
611	Jewel Settings and Mountings
566	Jigs and Fixtures
893	Job Evaluation
757	Journalism
482	Journals, Trade (Periodicals)
387	Juices
584	Junction Boxes, Electrical
429	Jute Fabrics

K

346 Kaolin
551 Kegs, Metal
525 Key Cases
369 Kilns
467 Kitchen Cabinets
519 Kitchenware, Plastic
619 Kits, Embroidery
424 Knitted Fabrics
583 Knives, Electric (Household)
552 Knives (Non-Electric Household)

L

329 Laboratory Animals
601 Laboratory Instruments and Equipment
925 Laboratory Services, Clinical
899 Laboratory Services, Commercial Testing
432 Lace Goods
495 Lacquers
457 Ladders, Wood
474 Laminated and Corrugated Paper
584 Lamp Fixtures
554 Lamp Posts, Metal
584 Lamp Receptacles
584 Lamps, Electric (Bulbs, Tubes, etc.)
584 Lamp Sockets
584 Lamps, Photoflash and Photoflood
592 Landing Gear, Aircraft
969 Landscaping Services
584 Lanterns
613 Lapidary Work
719 Laser Engineering
586 Laser Systems
906 Laundry Services
583 Laundry Equipment, Household
572 Laundry Machinery, Commercial
353 Lead and Zinc Ores
532 Leaded Glass
543 Lead, Smelted and Refined
559 Leaf and Foil, Metal
529 Leashes and Collars, Dog
521 Leather
520 LEATHER AND LEATHER PRODUCTS
434 Leather, Artificial
529 Leather Belting
449 Leather Clothing
523 Leather Gloves and Mittens
931 Lecturing Services
486 Ledgers
486 Ledger Sheets
932 Legal Services
603 Lenses
605 Lenses, Contact
605 Lenses, Ophthalmic
605 Lenses, Sunglasses
899 Lettering Services
365 Levees
933 Library Services
556 License Tags
953 Licensing Services
519 Life Jackets and Life Rafts, Rubber
730 LIFE SCIENCES
586 Light-Emission Operating Apparatus
854 Lighterage Services
593 Lighters (Boats)
584 Lighting Equipment, Electric
581 Lighting Fixture Ballasts
584 Lighting Fixtures, Electric
912 Lighting Services, Theatrical
584 Lightning Arrestors
341 Lignite
536 Lime, Hydrated and Quicklime
429 Linen Fabrics
906 Linen-Supply Services
581 Line-Voltage Regulators
749 Linguistics
619 Linings, Casket
872 Liquefied Petroleum (LP) Gas Services
395 Liquors
757 Literature
894 Loan Services
852 Local Passenger Transportation Services
853 Local Trucking Services
467 Lockers
365 Locks (Marine Construction)
594 Locomotive Frames, Engines, and Parts
594 Locomotives
902 Lodging Services
719 Logistics Engineering
451 Logs
853 Long-Distance Trucking Services
486 Looseleaf Binders
501 Lubricants
524 Luggage
452 Lumber

450 LUMBER AND WOOD PRODUCTS

M

397 Macaroni
713 Machine and Structure Design and Development, Agricultural
560 & 570 MACHINERY AND EQUIPMENT, EXCEPT ELECTRICAL
566 Machine Tool Accessories
566 Machine Tool Measuring Devices
566 Machine Tools, Metal-Cutting and Forming
482 Magazines
585 Magnetic Tape, Prerecorded
589 Magnetos
901 Maid Services
566 Maintenance Equipment, Automotive
457 Mallets
395 Malt Beverages
893 Management Services, General
484 Manifold Business Forms
619 Mannequins
872 Manufactured Gas Services
319 Maple Sap
716 Mapping
489 Maps
854 Marine Cargo-Handling Services
365 Marine Construction
714 Marine Engineering
330 MARINE LIFE
617 Marking Devices
457 Marquetry
909 Massage Services
619 Matches
565 Materials-Handling Machinery and Equipment
720 MATHEMATICS
721 Mathematics, Actuarial
464 Mattresses
903 Meal Services, except Domestic
602 Measurement Instruments, Industrial Process Variables
602 Measuring and Controlling Instruments
602 Measuring and Testing Instruments, Electricity and Electrical Signals
600 MEASURING INSTRUMENTS
603 Measuring Instruments, Fire Control
603 Measuring Instruments, Optical
572 Measuring Pumps
382 Meat Products, Processed
706 Mechanical Engineering
552 Mechanics' Handtools
607 Mechanisms, Clockwork-Operated
926 Medical Aid Services
926 Medical Assistant Services
926 Medical Attendant Services
600 MEDICAL GOODS
604 Medical Instruments and Apparatus
920 MEDICAL SERVICES
604 Medicated Plasters
493 Medicinal Chemicals
493 Medicinal Powders, Solutions, and Suspensions
303 Melon Crops
880 MERCHANDISING SERVICES
357 Mercury Ores
899 Message Services, Telephone
399 Messenger Services
467 Metal and Wood Fixtures
554 Metal Buildings, Prefabricated
551 Metal Cans and Containers
542 Metal Castings, Ferrous and Nonferrous
589 Metal-Cutting-and-Forming Machines, Electron Beam
566 Metal-Cutting Machine Tools
540 METAL, FERROUS AND NONFERROUS
467 Metal Fixtures
559 Metal Foil and Leaf
556 Metal Forgings and Stampings
566 Metal-Forming Machine Tools
463 Metal Household Furniture
350 METALLIC MINERALS, RAW
711 Metallurgical Engineering
466 Metal Office Furniture
466 Metal Public-Building Furniture
604 Metals, Dental
611 Metals, Precious
554 Metal Work, Architectural and Ornamental
566 Metalworking Machinery and Equipment
725 Meteorology
581 Metering Panels
602 Meters, Totalizing-Fluid and Counting Services
712 Methods Engineering
349 Mica
606 Microfilm Equipment

603 Microscopes
952 Military Services
598 Military Tanks and Tank Components
321 Milk, Raw
452 Millwork Products
564 Mine Cars
564 Mineral-Cleaning Machinery
725 Mineralogy
347 Minerals, Chemical and Fertilizer
340 MINERALS, NONMETALLIC
539 Mineral Wool
708 Mining Engineering
564 Mining Machinery and Equipment
372 Mines (Military)
944 Ministerial Services
457 Mirror and Picture Frames
532 Mirrors
610 MISCELLANEOUS FABRICATED PRODUCTS
960 MISCELLANEOUS SERVICES
586 Missile-Control Systems
375 Missiles, Guided
869 Missile-Tracking Services
372 Missile Warheads
523 Mittens, Leather
872 Mixed Gas Services
455 Mobile Homes
522 Moccasins
885 Modeling Services
392 Molasses
474 Molded and Pressed Pulp Goods
519 Molded Plastics
554 Molding and Trim, Metal
452 Moldings, Wood
566 Molds, Industrial
565 Monorail Systems
537 Monumental Stone
435 Mopheads
371 Mortars
532 Mosaic Glass
319 Moss, Spanish
606 Motion-Picture Cameras
911 Motion-Picture Casting and Directing Services
911 Motion-Picture Developing and Printing Services
911 Motion-Picture Film Editing Services
753 Motion-Picture Photography
911 Motion-Picture Production and Distribution Services
606 Motion-Picture Projection Equipment
911 Motion-Picture Rental Services
712 Motion Study Engineering
595 Motorcycles and Parts
853 Motor-Freight Transportation Services
853 Motor-Freight Warehousing Services
582 Motor Generator Sets
591 Motor Homes
582 Motors, except Starting Motors
582 Motors, Railway
589 Motors, Starting
582 Motor Starters (Industrial Controls)
591 Motor-Vehicle Accessories
591 Motor-Vehicle Engines (except Diesel)
552 Motor-Vehicle Hardware
591 Motor Vehicles and Parts
611 Mountings, Jewel
565 Moving Stairways
933 Museum Services
319 Mushrooms
756 Music
524 Musical Instrument Cases
614 Musical Instruments and Parts

N

549 Nails, Nonferrous Metal
541 Nails, Steel
435 Napkins
423 Narrow Fabrics
387 Native Foods, Canned
414 Natural Fibers
342 Natural Gas
872 Natural Gas Services
601 Nautical Instruments
371 Naval Guns
586 Navigational Electronic Equipment
601 Navigational Instruments
447 Neckpieces, Fur
442 Neckwear, Men's and Boys'
443 Neckwear, Women's, Girls', and Infants'
618 Needles
319 Needles, Balsam
619 Neon Signs
481 Newspapers
472 Newsprint
899 News-Reporting Services
442 Nightwear, Men's and Boys'
444 Nightwear, Women's, Girls' and Infants'

539 Nonclay Refractories and Crucibles
473 Nonconverted Building Paper and Board
472 Nonconverted Paper and Paperboard (except Building)
496 Noncyclic Organic Chemicals
540 NONFERROUS METAL
542 Nonferrous Metal Castings
544 Nonferrous Metals, Rolled, Drawn, and Extruded
543 Nonferrous Metals, Smelted and Refined
340 NONMETALLIC MINERALS
425 Nonwoven Fabrics (except Knitted)
397 Noodles
618 Notions
618 Novelties, Costume
619 Novelties, Advertising
532 Novelties, Glass
519 Novelties, Plastic
871 Nuclear Electricity Generating Services
715 Nuclear Engineering
602 Nuclear Instruments
366 Nuclear Powerplants
311 Nursery Products, Floricultural
314 Nursery Products, Forest
942 Nursery School Services
924 Nursing Services
555 Nuts and Bolts
393 Nuts, Salted
306 Nuts, Tree

O

457 Oars, Wood
586 Object-Detection Apparatus
725 Oceanography
484 Office Forms
466 Office Furniture, Metal
465 Office Furniture, Wood
571 Office Machines
617 Office Materials
553 Oil-Burning Heaters
434 Oilcloth
564 Oil-Field Machinery and Equipment
368 Oil Refineries
385 Oils and Fats, Edible
501 Oils, Illuminating
564 Oil-Well Machinery and Equipment
493 Ointments
941 Old-Age-Assistance Services
305 Olives
603 Opera Glasses
721 Operations Research
605 Ophthalmic Frames
605 Ophthalmic Goods
604 Ophthalmic Instruments and Apparatus
719 Optical Engineering
600 OPTICAL GOODS
603 Optical Instruments
603 Optical Measuring-and-Testing Instruments
603 Optical Sighting Equipment
923 Optometric Services
370 ORDNANCE
719 Ordnance Engineering
496 Organic Chemicals
496 Organic Chemicals, Noncyclic
723 Organic Chemistry
496 Organic Solvents
614 Organs
554 Ornamental Metal Work
312 Ornamental Trees
618 Ornaments
942 Orphanage Services
604 Orthopedic Appliances
449 Outer Garments, Waterproof (except Rubber or Rubberized)
443 Outerwear, Women's, Girls', and Infants'
584 Outlets, Electrical
369 Ovens (Construction and Maintenance)
583 Ovens, Household
568 Ovens, Industrial Process
441 Overcoats, Men's and Boys'
584 Overhead Trolley-Line Material

P

504 Packaged Fuel
719 Packaging Engineering
538 Packing, Asbestos
433 Padding
617 Pads, Inking
551 Pails, Metal
495 Paintbrush Cleaners
751 Painting (Art)
495 Paint Remover
619 Paint Rollers

495	Paints
725	Paleontology
454	Pallets, Wood
483	Pamphlets and Books
581	Panels, Metering
470	PAPER AND ALLIED PRODUCTS
472	Paper and Paperboard, Nonconverted (except Building)
474	Paper and Paperboard Products, Converted (except Containers and Boxes)
474	Paper Bags
474	Paperboard and Paper, Die Cut
475	Paperboard Containers and Boxes
557	Paper Clips
474	Paper, Coated, Glazed, or Varnished
567	Paper Industry Machinery and Equipment
474	Paper Novelties
489	Paper Patterns
606	Paper, Sensitized
472	Paper Stock
539	Papier-Mache, Statuary and Art Goods
439	Parachutes
501	Paraffin Wax
472	Parchment Paper
362	Parking Areas
961	Parking Services
362	Parkway
949	Parole Services
456	Particleboard
467	Partitions
591	Passenger-Car Bodies
732	Pathology
568	Patterns, Industrial
563	Pavers
502	Paving Materials
399	Peanut Butter
302	Peanut Crops
617	Pencils, Lead
617	Pencils, Mechanical
617	Pens
494	Perfumes
496	Perfume, Synthetic
482	Periodicals
900	PERSONAL SERVICES
893	Personnel Administration Services
713	Pest-Control Engineering
497	Pesticides
500	PETROLEUM AND RELATED PRODUCTS
342	Petroleum, Crude
708	Petroleum Engineering
501	Petroleum Products
725	Petrology
465	Pews, Wood
493	Pharmaceutical Preparations
732	Pharmacology
749	Philology
461	Phonograph Cabinets, Wood
613	Phonograph-Needle Points, Cut and Polished Jewel
585	Phonograph Records
585	Phonographs
347	Phosphate Rock
606	Photocopy Equipment
897	Photocopying Services
897	Photofinishing Services
584	Photoflash Lamps
584	Photoflood Lamps
716	Photogrammetry
606	Photographic Chemicals
719	Photographic Engineering
606	Photographic Equipment and Supplies
600	PHOTOGRAPHIC GOODS
753	Photography
753	Photography, Movie and Still
723	Physical Chemistry
602	Physical-Property Testing Apparatus
720	PHYSICAL SCIENCES
921	Physician Services
921	Physician Surgical Services
724	Physics
732	Physiology
614	Pianos
457	Picture and Mirror Frames
365	Piers
541	Pig Iron
491	Pigments, Inorganic
496	Pigments, Synthetic Organic
543	Pigs, Nonferrous Metal
451	Pilings
435	Pillowcases
435	Pillows
319	Pine Gums
618	Pins
519	Pipe and Pipe Fittings, Plastic
536	Pipe, Concrete
559	Pipe, Fabricated
559	Pipe Fittings and Valves, Metal (except Plumbers')
364	Pipe Lines (Construction)

856	Pipeline Transportation Services
541	Pipes and Tubing, Iron and Steel
544	Pipes and Tubing, Nonferrous Metal
943	Placement Services
452	Planing-Mill Products
300	PLANT FARM CROPS
712	Plant-Layout Engineering
493	Plasmas
536	Plaster
536	Plasterboard
539	Plaster of Paris, Statuary and Art Goods
512	Plastic Footwear
468	Plastic Furniture and Fixtures
514	Plastic Hose and Belting
496	Plasticizers
510	PLASTIC PRODUCTS
492	Plastics Materials
612	Plated Ware
531	Plate Glass
541	Plates, Iron and Steel
544	Plates, Nonferrous Metal
606	Plates, Sensitized
554	Plate Work, Fabricated (Boiler Shops)
359	Platinum Ore
616	Playground Equipment
604	Pliers, Dental
584	Plugs, Attachment-Wiring
553	Plumbing-Fixture Fittings and Trim (Brass Groods)
535	Plumbing Fixtures and Fittings, China and Earthenware
553	Plumbing Fixtures, Enameled Metal
618	Plumes
453	Plywood
603	Polariscopes
451	Poles, Wood
951	Police Protection Services
583	Polishers, Floor (Household)
572	Polishing Machines, Floor (Commercial)
742	Political Science
719	Pollution Control (Engineering)
729	Pollution Control (Technical)
496	Polyhydric Alcohols
616	Pool Tables and Equipment
535	Porcelain Electrical Supplies
535	Porcelain Ware
564	Portable Rock Drills
905	Portering Services
954	Postal Services
451	Posts, Wood
347	Potash
399	Potato Chips
535	Pottery Products
525	Pouches, Tobacco
324	Poultry
504	Powdered Fuel
549	Powdered Iron
493	Powders, Medicinal
364	Power and Communication Lines
566	Power-Driven Handtools
581	Power Fuse Devices
581	Power Fuse Mountings
366	Powerplant Projects
563	Power Shovels
581	Power Switches
581	Power Switching Equipment
581	Power Transformers
568	Power-Transmission Equipment, Mechanical
611	Precious Metal Jewelry
611	Precious Metals
554	Prefabricated Metal Buildings
455	Prefabricated Wood Buildings
899	Press Clipping Services
474	Pressed and Molded Pulp Goods
531	Pressed Glass and Glassware
531	Pressed-Glass Tableware
572	Pressing Machines
906	Pressing Services
589	Primary Batteries, Dry and Wet
480	PRINTED AND PUBLISHED PRODUCTS
587	Printed Circuits
499	Printing Ink
911	Printing Services, Motion Picture
567	Printing Trade Machinery and Equipment
603	Prisms
949	Probation Services
712	Production Engineering
898	Production Services
872	Production Services, Gas
911	Production Services, Motion Picture
912	Production, Theater Services
889	Professional Shopping Services
489	Programs, Racetrack
606	Projection Apparatus
592	Propellers, Aircraft
951	Property Security Services
596	Propulsion Units, Space Vehicles
604	Prosthetic Appliances
951	Protection Services (except Military)

951 Protection Services, Fire and Police
951 Protection Services, Wildlife
733 Psychology
585 Public Address Systems
466 Public-Building Furniture, Metal
465 Public-Building Furniture, Wood
361 Public Buildings
896 Public Relations Services
853 Public Warehousing and Storage Services
471 Pulp
474 Pulp Goods, Pressed and Molded
349 Pumice
364 Pumping Stations
568 Pumps and Pumping Equipment
572 Pumps, Measuring and Dispensing
525 Purses
599 Pushcarts
495 Putty

Q

712 Quality-Control Engineering
536 Quicklime
435 Quilts

R

489 Racetrack Programs
914 Racetrack Services
467 Racks
586 Radar (Object Detection Apparatus)
586 Radar (Production and Repair)
869 Radar Services
553 Radiators (Heating)
863 Radio Broadcasting Services
461 Radio Cabinets, Wood
556 Radio Chassis
587 Radio Electron Tubes
925 Radiological Services
585 Radio Receiving Sets (except Communication Types)
585 Radios Auto
862 Radio Services, Telegraph Communication
861 Radio Services, Telephone Communication
586 Radio Transmitting and Signaling Equipment
364 Radio Transmitting Towers
358 Radium Ore
519 Rafts, Rubber Life
594 Railroad Cars and Equipment
466 Railroad Car Seats
594 Railroad Equipment (including Engines)
851 Railroad Line-Haul Services
367 Railroads
851 Railroad Switching Services
851 Railroad Terminal Services
851 Railroad Transportation Service, Interurban
582 Railway Control Equipment
582 Railway Motors
586 Railway Signals
449 Raincoats (except Rubber or Rubberized)
429 Ramie Fabrics
583 Ranges, Household
594 Rapid-Transit Cars and Equipment
469 Rattan Furniture and Fixtures
459 Rattan Products
340 RAW FUELS AND NONMETALLIC MINERALS
350 RAW METALLIC MINERALS
321 Raw Milk
552 Razors
583 Razors, Electric
529 Razor Strops
895 Real Estate Services
486 Receipt Books
587 Receiving Antennas
513 Reclaimed Rubber
486 Record Albums
585 Recorders, Home
419 Recovered Fibers
910 RECREATION
943 Recruitment Services
395 Rectified Liquors
582 Rectifiers
581 Rectifier Transformers
469 Reed Furniture and Fixtures
459 Reed Products
368 Refineries, Oil
314 Reforestation
603 Refractometers
539 Refractories, Nonclay
706 Refrigeration Engineering
573 Refrigeration Equipment, Commercial and Industrial
573 Refrigeration Systems, Commercial and Industrial

583	Refrigerators, Household
941	Refugee Services
874	Refuse Services
953	Regulatory Law Control Services
953	Regulatory Law Investigation Services
899	Rental and Leasing Equipment Services
884	Rental Services
911	Rental Services, Motion Picture
914	Rental Services, Sports Equipment
899	Reporting Service, News
361	Residential Buildings
942	Residential-Care Services, Adult and Child
602	Residential Environmental-Regulating Controls
319	Resins, Natural
492	Resins, Synthetic
587	Resistors, Electronic Applications
942	Rest-Home Services
881	Retail-Trade Services
953	Revenue Services
582	Rheostats
755	Rhythmics
423	Ribbons
617	Ribbons, Inked
555	Rivets
449	Robes
564	Rock-Crushing Machinery
564	Rock Drills, Portable
347	Rock Salt
541	Rods and Bars, Iron and Steel
544	Rods and Bars, Nonferrous Metal
568	Roller Bearings
616	Roller Skates
566	Rolling-Mill Machinery and Equipment
541	Rolling-Mill Products
443	Rompers
473	Roofing Board
503	Roofing Coatings and Cements
503	Roofing Felts
503	Roofing Materials
534	Roofing Tile
902	Rooming-House Services
883	Route Sales Services
510	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS
519	Rubber, Clothing
319	Rubber, Crude
512	Rubber Footwear
514	Rubber Hose and Belting
519	Rubberized Fabrics
496	Rubber-Processing Chemicals
513	Rubber, Reclaimed
519	Rubber Specialties and Sundries
492	Rubber Synthetic
431	Rugs

S

529	Saddlery
559	Safes
604	Safety Appliances and Equipment
953	Safety Control and Investigation Services
712	Safety Engineering
387	Salad Dressings
484	Salesbooks
885	Sales-Promotion Services
883	Sales-Route Services
393	Salted Nuts
347	Salt, Rock
491	Salts, Inorganic
486	Sample Books
522	Sandals
345	Sand and Gravel
572	Sanding Machine, Floor
538	Sandpaper
579	Sand Riddles
704	Sanitary Engineering
474	Sanitary Paper Products
874	Sanitary Services
554	Sash, Metal
503	Saturated Roofing Felts
387	Sauces
894	Savings and Loan Services
552	Saw Blades
452	Sawmill Products
552	Saws, Hand
571	Scales (except Laboratory)
912	Scenery-Design Services
912	Scenery-Lighting Services
852	School-Bus Services
942	School Services, Nursery
942	School Services, Training
601	Scientific Research Instruments (except Optical Instruments)
552	Scissors
557	Screening, Wire
555	Screw-Machine Products
555	Screws
751	Sculpturing

386	Seafood, Fresh or Frozen Packaged
386	Seafoods, Processed
499	Sealants
495	Sealers, Wood
538	Sealing Devices, Asbestos
617	Seals, Hand
584	Searchlights
464	Seats, Aircraft, Automobile, Railroad, and Public Conveyances
387	Seasonings
339	Sea Urchins
339	Seaweed
891	Secretarial Services
894	Securities and Commodities Services
951	Security Property Services
311	Seeds, Flower and Vegetable
314	Seeds, Tree
725	Seismology
587	Semiconductors
561	Semi-Diesel Engines and Parts
606	Sensitized Cloth, Film, Paper, and Plates
493	Serums
572	Service-Industry Machinery
613	Settings, Cut and Polished Jewel
611	Settings, Jewel
364	Sewage-Collection and Disposal Lines
874	Sewerage Services
364	Sewer Mains
534	Sewer Tile
461	Sewing-Machine Cabinets, Wood
583	Sewing Machines, Domestic
583	Sewing Machines, Industrial
469	Shades, Window
552	Shears
323	Sheep
449	Sheepskin-Lined Clothing
554	Sheet-Metal Work
489	Sheet Music
435	Sheets
541	Sheets and Strips, Iron and Steel
544	Sheets and Strips, Nonferrous Metal
332	Shellfish
467	Shelving
452	Shingles, Wood
714	Ship-Machinery Design and Development
593	Ships
593	Ships, Cargo Vessel and Tankers
593	Ships, Combat Vessel
593	Ships, Hydrofoil
442	Shirts, Men's and Boys'
443	Shirts, Women's, Girls', and Infants'
423	Shoelaces
522	Shoes, Athletic
906	Shoeshine Services
489	Shopping News
889	Shopping Services, Professional
571	Shorthand Machines
563	Shovels, Power
519	Shower Stalls, Plastic
311	Shrubbery
452	Shutters, Wood
586	Sighting Equipment, Electronic
603	Sighting Equipment, Optical
854	Sightseeing Boat Service
603	Sights, Telescopic
586	Signals, Railway
586	Signals, Traffic
899	Sign Painting-and-Lettering Services
619	Signs
619	Signs, Neon
421	Silk Fabrics
414	Silk Fibers
354	Silver and Gold Ore
612	Silverware
392	Sirup, Cane and Beet
394	Sirup, Flavoring
616	Skates, Roller and Ice
454	Skids, Wood
521	Skins
443	Skirts
369	Ski-Tow Erection
543	Slabs, Nonferrous Metal
439	Sleeping Bags
618	Slide Fasteners
435	Slipcovers
522	Slippers
373	Small Arms
374	Small-Arms Ammunition (30 mm or 1.18 inch and below)
541	Smelted and Refined Ferrous Metals
543	Smelted and Refined Nonferrous Metals
379	Smoke Generators
619	Smoking Pipes
403	Smoking Tobacco
618	Snap Fasteners
562	Snow Blowers and Throwers
599	Snowmobiles
403	Snuff
494	Soap
940	SOCIAL, EMPLOYMENT, AND SPIRITUAL SERVICES

740	SOCIAL SCIENCES
941	Social Services
744	Sociology
584	Sockets and Receptacles, Lamps
311	Sod
347	Soda
573	Soda-Fountain-Dispensing Units
464	Sofa Beds
396	Soft Drinks
617	Soft-Tipped Markers
713	Soil-Conservation Engineering
731	Soil Science
553	Solar Heaters
582	Solenoid Switches
493	Solutions, Medicinal
496	Solvents, Organic
387	Soups
583	Space Heaters
596	Space Vehicles and Parts
397	Spaghetti
319	Spanish Moss
589	Spark Plugs
909	Spa Services, Health
581	Specialty Transformers
603	Spectrometers
603	Spectroscopes
568	Speed Changers
602	Speedometers
391	Spices
549	Spikes, Nonferrous Metal
541	Spikes, Steel
944	Spiritual Services
339	Sponges
616	Sporting Goods, (except Firearms and Apparel)
914	Sports Equipment, Rental Services
913	Sports-Participants Services
914	Sports Services
464	Spring Cushions
559	Springs, Steel
557	Springs, Wire
565	Stackers
532	Stained Glass
612	Stainless-Steel Ware
565	Stairways, Moving
452	Stairways, Wood
432	Stamped Art Goods, Textile
556	Stampings, Automobile
556	Stampings, Metal
617	Stamps, Hand
467	Stands (Wood and Metal)
549	Staples, Nonferrous Metal
541	Staples, Steel
584	Starters, Fluorescent
582	Starters, Motor
589	Starting Motors
474	Stationary
539	Statuary, Plaster of Paris and Papier-Mache
909	Steam-Bath Services
561	Steam Engines (except Locomotive)
553	Steam or Hot-Water Domestic Furnace
875	Steam-Supply Services
561	Steam Turbines
541	Steel and Iron Pipes and Tubing
541	Steel and Iron Plates, Sheets, Strips, Rods, and Bars
549	Steel Balls
541	Steel Cable
541	Steel Ingots
617	Steel Letters and Figures
541	Steel Nails, Spikes, Staples
541	Steel Wire
538	Steel Wool
541	Steelworks Products
617	Stencils
891	Stenographic Services
606	Still Cameras
753	Still Photography
898	Stock-Chasing Services
859	Stockyard Services
537	Stone, Building and Monumental
530	STONE, CLAY, AND GLASS PRODUCTS
344	Stone, Crushed and Broken
537	Stone, Cut
343	Stone, Dimension
537	Stone Products
535	Stoneware
589	Storage Batteries
961	Storage Services, Automobile
906	Storage Services, Garment
853	Storage Services, Public
583	Stoves, Household
459	Straw Products
594	Street Cars and Equipment
874	Street-Cleaning Services
852	Street-Railway Services
362	Streets and Highways
615	Strollers, Baby
534	Structural Clay Products
534	Structural Clay Tile
554	Structural Metal, Fabricated

455	Structural Wood Members
713	Structure and Machine Design and Development, Agricultural
360	STRUCTURES
393	Stuffed Dates
852	Suburban-Transit Passenger-Transportation Services
367	Subways
852	Subway-Transportation Services
392	Sugar, Cane and Beet
302	Sugar Crops
441	Suits, Men's and Boys'
443	Suits, Women's, Girls' and Infants'
347	Sulfur
605	Sunglass Lenses
604	Supporters, Abdominal
604	Surgical Appliances
604	Surgical Dressings
604	Surgical Gauze
604	Surgical, Medical, and Dental Instruments and Apparatus
922	Surgical Services, Dental
921	Surgical Services, Physician
716	Surveying
601	Surveying Instruments
449	Suspenders
493	Suspensions, Medicinal
604	Sutures
581	Switchboards and Apparatus, Electrical
584	Switches, Electrical
587	Switches, Electronic
581	Switches, Power
581	Switchgear Apparatus, Electrical
581	Switching Equipment, Power
421	Synthetic-Fiber Fabrics
414	Synthetic Fibers
492	Synthetic Fibers (except Glass)
496	Synthetic Flavoring
496	Synthetic Organic Dyes
496	Synthetic Organic Pigments
496	Synthetic Perfume
492	Synthetic Resins
492	Synthetic Rubber
496	Synthetic Tanning Agents

T

435	Tablecloths
474	Tablets, Paper
493	Tablets, Pharmaceutical
519	Tableware, Plastic
349	Talc
371	Tank Guns
598	Tanks and Tank Components, Military
496	Tanning Agents, Synthetic
585	Tape Players, Auto
604	Tapes, Adhesive
423	Tapes, Fabric
436	Tarpaulins
502	Tar-Paving Mixtures and Blocks
854	Taxi-Boat Services
852	Taxicab Services
969	Taxidermy Services
602	Taximeters
391	Tea
319	Teaberries
489	Technical Papers
604	Teeth, Artifical
519	Teething Rings
586	Telegraph Apparatus and Parts
862	Telegraph Communications, Radio or Wire Services
364	Telegraph Lines
586	Telephone Apparatus and Parts
467	Telephone Booths
861	Telephone Communications, Radio or Wire Services
364	Telephone Lines
899	Telephone Message Services
869	Telephoto Services
603	Telescopes
603	Telescopic Sights
864	Television Broadcasting Services
461	Television Cabinets, Wood
556	Television Chassis
587	Television-Receiving Electron Tubes
585	Television-Receiving Sets
586	Television-Signaling Equipment
586	Television-Transmitting Equipment
364	Television-Transmitting Towers
616	Tennis Goods
436	Tents
855	Terminal Services, Airport
852	Terminal Services, Bus Lines
339	Terrapins
602	Testers, Diodes and Transistors
602	Testing Apparatus, Physical Property
602	Testing Instruments, Electricity
603	Testing Instruments, Fire Control
603	Testing Instruments, Optical
899	Testing-Laboratory Services, Commercial
436	Textile Bags

410	TEXTILE FIBERS AND RELATED
567	Textile Industrial Machinery and Equipment
430	TEXTILE PRODUCTS
432	Textiles, Fancy
912	Theater-Booking and Casting Services
912	Theater Services
924	Therapeutic Services
412	Thread
562	Throwers, Snow
869	Ticker-Tape Services
912	Ticket-Agency Services
911	Ticket-Taking Services, Motion Picture
912	Ticket-Taking Services, Theater
451	Timber Products, Untreated
313	Timber, Standing
313	Timber Tracts
898	Timekeeping Services
607	Timers, Appliance
712	Time-Study Engineering
359	Tin Ore
511	Tires and Tubes
359	Titanium Ore
583	Toasters, Electric
403	Tobacco, Chewing, Smoking, and Snuff
302	Tobacco Crops
525	Tobacco Pouches
400	TOBACCO PRODUCTS
404	Tobacco, Stemmed and Redried
494	Toilet Preparations
457	Toilet Seats, Wood
859	Toll-Bridge and Road Service
552	Tools, Garden
566	Tools, Special
583	Toothbrushes, Electric
457	Toothpicks
716	Topography
372	Torpedoes
602	Totalizing Fluid Meters
859	Tourist-Agency Services
919	Tourist-Guide Services
435	Towels
854	Towing Services (Marine)
961	Towing Services, Automobile
493	Toxoids
615	Toy Air Rifles
615	Toys and Games
519	Toys, Rubber
869	Tracking Services, Missiles
594	Trackless Trolleys
565	Tractors
562	Tractors, Farm and Garden (Wheel)
482	Trade Journals
899	Trading-Stamp Services
586	Traffic Signals
586	Traffic Signals, Highway and Railway
902	Trailer-Park Services
565	Trailers
597	Trailers, Travel
591	Trailers, Truck
913	Trainers, Athletic
942	Training-School Services
931	Training Services, Vocational
587	Transformers
581	Transformers, Distribution
581	Transformers, Doorbell
581	Transformers, Power
581	Transformers, Rectifiers
581	Transformers, Specialty
602	Transistor Testers
581	Transmission Equipment, Electric
587	Transmitting Electron Tubes
590	TRANSPORTATION EQUIPMENT
850	TRANSPORTATION SERVICES
855	Transportation Services, Air
855	Transportation Services, Air-Cargo and Passenger
854	Transportation Services, Deep Sea
852	Transportation Services, Local Passenger
853	Transportation Services, Motor Freight
856	Transportation Services, Pipeline
854	Transportation Services, Water
583	Trash Compactors, Household
859	Travel-Agency Services
941	Travelers'-Aid Services
597	Travel Trailers
306	Tree Nuts
618	Trees, Artifical
314	Tree Seeds
312	Trees, Ornamental
554	Trim and Molding, Metal
889	Trimming Services, Window
447	Trimmings, Fur
432	Trimmings, Textile
611	Trimmings, Umbrella
852	Trolley-Coach Services
584	Trolley-Line Material, Overhead
594	Trolleys, Trackless
612	Trophies
442	Trousers

591 Truck Bodies
853 Trucking Services, Local and Long-Distance
853 Trucking-Terminal Services
565 Trucks, Industrial
591 Truck Trailers
604 Trusses, Abdominal
894 Trust Services
511 Tubes and Tires
587 Tubes, Industrial Electron
587 Tubes, Radio and Television Receiving, Electron
587 Tubes, Special-Purpose, Electron
587 Tubes, Transmitting Electron
589 Tubes, X-Ray
541 Tubing and Pipes, Iron and Steel
544 Tubing and Pipes, Nonferrous Metal
593 Tugboats
854 Tugboat Services
363 Tunnels
859 Tunnel Services
561 Turbine-Generator-Set Units
561 Turbines
561 Turbines, Hydraulic, Steam, and Gas (except Aircraft)
339 Turtles
441 Tuxedos
413 Twine
571 Typewriters
891 Typing Services

U

589 Ultrasonic Cleaning Machines
589 Ultrasonic Welding Machines
584 Ultraviolet-Lamp Fixtures
619 Umbrellas
611 Umbrella Trimmings
961 Undercoating Services, Automobile
441 Uniforms
444 Undergarments, Women's, Girls', and Infants'
442 Underwear, Men's and Boys'
444 Underwear, Women's, Girls', and Infants'
433 Upholstery Filling
358 Uranium Ore
911 Ushering Services, Motion Picture
912 Ushering Services, Theater

V

493 Vaccines, Bacterial and Virus
583 Vacuum Cleaners, Household
572 Vacuum Cleaners, Industrial
559 Valves and Pipe Fittings, Metal (except Plumbers')
358 Vanadium Ores
584 Vapor Lamps
582 Variable Capacitors
474 Varnished Paper
495 Varnishes
495 Varnish Remover
559 Vaults
619 Vaults, Burial
514 V-Belts
303 Vegetable Crops
387 Vegetables and Fruits, Processed
311 Vegetable Seeds and Plants
615 Vehicles, Children's (except Bicycles)
584 Vehicular-Lighting Equipment
884 Vending Services
453 Veneer
706 Ventilation Engineering
568 Ventilator Fans
397 Vermicelli
441 Vests
604 Veterinary Instruments and Apparatus
929 Veterinary Services
363 Viaducts
493 Vials, Pharmaceutical Preparations
398 Vinegar
614 Violins
493 Virus Vaccines
931 Vocational-Training Services
581 Voltage Regulators, Line
602 Voltmeters

W

433 Wadding
473 Wallboard
474 Wallpaper
534 Wall Tile, Ceramic
853 Warehousing Services, Motor Freight
853 Warehousing Services, Public
589 Warm-Air Furnaces, Electric
573 Warm-Air Furnaces, (except Electric)

435 Washcloths
555 Washers, Metal
572 Washing Machinery, Car
572 Washing Machines, Floor
583 Washing Machines, Household and Coin-Operated
961 Washing Services, Automobile
419 Waste Fibers
607 Watchcases
532 Watch Crystals
600 WATCHES AND CLOCKS
607 Watches and Parts
519 Water Bottles, Rubber
713 Water-Conservation Engineering
583 Water Heaters, Household
364 Water Mains
602 Watermeters
449 Waterproof Outer Garments (except Rubber or Rubberized)
873 Water-Supply Services
854 Water-Transportaton Services
369 Water-Treatment Plants
365 Waterway Construction
854 Waterway-Transportation Services, Inland
564 Water-Well Machinery and Equipment
587 Wave Guides, Electronic
583 Waxers, Floor
905 Waxing Services, Floor
582 Welding Apparatus, Electric
566 Welding Equipment
589 Welding Machines, Ultrasonic or Electron-Beam
941 Welfare Services
564 Well Machinery and Equipment
589 Wet Primary Batteries
519 Wet Suits, Rubber
339 Whales
365 Wharves
599 Wheelbarrows
562 Wheel Tractors, Farm and Garden
529 Whips, Leather
882 Wholesale Trade Services
469 Wicker Furniture and Fixtures
459 Wicker Products
326 Wildlife and Game
951 Wildlife-Protection Services
469 Willow Furniture and Fixtures
459 Willow Products
603 Wind and Percentage Correctors
554 Window and Door Frames, Metal
469 Window Blinds and Shades
905 Window-Cleaning Services
452 Window Frames, Wood
531 Window Glass
889 Window-Trimming Services
395 Wines
544 Wire, Nonferrous Metal
557 Wire Products
862 Wire Services, Telegraph Communications
861 Wire Services, Telephone Communications
557 Wire Springs
541 Wire, Steel
584 Wiring Equipment, Electric
496 Wood and Gum Chemicals
467 Wood and Metal Fixtures
457 Wood Articles
451 Wood Bolts
455 Wood Buildings, Prefabricated
553 Wood-Burning Heaters
454 Wood Containers
495 Wood Filler
467 Wood Fixtures
461 Wood Household Furniture (except Upholstered)
462 Wood Household Furniture, Upholstered
465 Wood Office Furniture
452 Wood Products, Treated
465 Wood Public-Building Furniture
495 Wood Sealers
567 Woodworking Industrial Machinery and Equipment
422 Wool Fabrics
422 Wool Felt
442 Work Clothing, Men's and Boys'

X

589 X-Ray Apparatus
589 X-Ray Tubes

Y

457 Yardsticks, Wood
411 Yarn
399 Yeast

Z

353 Zinc and Lead Ores
543 Zinc, Smelted and Refined
329 Zoo Animals
919 Zoological Garden Services

CHAPTER 9

GENERAL EDUCATIONAL DEVELOPMENT (GED)

Page

The Scales of General Educational Development 229

Estimating the GED Requirements of Jobs 229

Definitions and Examples of GED Levels for Each Scale 231

Reasoning Development.......................................231

Mathematical Development 236

Language Development 239

CHAPTER 9

GENERAL EDUCATIONAL DEVELOPMENT (GED)

General Educational Development (GED) is education of a general nature which contributes to the reasoning development and the acquisition of mathematical and language skills that are required of the worker to achieve average satisfactory job performance. This education, which does not have a recognized, specific occupational objective, can be obtained formally in elementary school, high school, or college, or informally through experience or independent study.

The Scales of General Educational Development

The 1972 *Handbook for Analyzing Jobs* required the assignment of one overall GED rating, which was determined by selecting the highest reasoning, mathematical, or language development level. GED is now presented as three distinct scales: reasoning development, mathematical development, and language development. There is no implied equivalence among identically numbered levels, and ratings from each scale, for a given job, are to be regarded and used independently.

The definitions of the levels of the mathematical and language development scales have been revised to essentially correspond with the definitions previously used in the Scale of GED which appeared in Volume II of the DOT, 3rd edition.[1] This was done because the former levels, defined more in terms of work activities than in terms of curriculum associated with specific grade levels, are more meaningful and useful for purposes of estimating mathematical and language development ratings. The reasoning development scale is unchanged.

Estimating the GED Requirements of Jobs

Carefully review the three Scales of GED and select the one level from each whose definition and examples best match the level of reasoning, mathematical, and language development required of the worker, based on the analysis of the job. Record the number of each level to indicate the "R," "M," and "L" ratings for this component.

---

[1] *Dictionary of Occupational Titles, Volume II, Occupational Classification and Industry Index*, 3rd ed. (Washington: U.S. Department of Labor, 1965).

SCALES OF GENERAL EDUCATIONAL DEVELOPMENT

Level	Reasoning Development	Level	Mathematical Development	Level	Language Development
6	Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Comprehend the most abstruse classes of concepts.	5 & 6	Apply knowledge of advanced mathematical and statistical techniques such as differential and integral calculus, factor analysis, and probability determination, or work with a wide variety of theoretical mathematical concepts and make original applications of mathematical procedures, as in empirical and differential equations.	5	Comprehension and expression at a level to— - Report, write, or edit articles for such publications as newspapers, magazines, and technical or scientific journals. Prepare and draw up deeds, leases, wills, mortgages, and contracts. - Prepare and deliver lectures on politics, economics, education, or science. - Interview, counsel, or advise such people as students, clients, or patients, in such matters as welfare eligibility, vocational rehabilitation, mental hygiene, or marital relations. - Evaluate technical engineering data to design buildings and bridges.
5	Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of technical instructions, in books, manuals, and mathematical or diagrammatic form. Deal with several abstract and concrete variables.				
4	Apply principles of rational systems[2] to solve practical problems and deal with a variety of concrete variables in situations where only limited standardization exists. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form.	4	Perform arithmetic, algebraic, and geometric procedures in standard, practical applications, such as shop math and accounting.	3 & 4	Comprehension and expression at a level to— - Transcribe dictation; make appointments and handle personal mail for, and interview and screen people wishing to speak to executives; and write routine correspondence on own initiative. - Interview job applicants to determine work best suited for their abilities and experience, and contact employers to interest them in services of agency. - Interpret technical manuals as well as drawings and specifications, such as layouts, blueprints, and schematics.
3	Apply common sense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables in or from standardized situations.	3	Make arithmetic calculations involving fractions, decimals, and percentages.		
2	Apply common sense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.	2	Use arithmetic to add, subtract, multiply, and divide whole numbers.	2	Comprehension and expression at a level to— - File, post, and mail such material as forms, checks, receipts, and bills. - Copy data from one record to another, fill in report forms, and type all work from rough draft or corrected copy. - Interview members of household to obtain such information as age, occupation, and number of children, to be used as data for surveys or economic studies. - Guide people on tours through historical or public buildings, describing such features as size, value, and points of interest.
1	Apply common sense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.	1	Perform simple addition and subtraction, reading and copying of figures, or counting and recording. Perform operations with units, such as cup, pint, and quart; inch, foot, and yard; and ounce and pound.	1	Comprehension and expression at a level to— - Learn job duties from oral instructions or demonstrations. - Write identifying information, such as name and address of customer, weight, number, or type of product, on tags or slips. - Request orally, or in writing, such supplies as linen, soap, or work materials.

---

[2] Examples of "principles of rational systems" are: bookkeeping, internal combustion engines, electric wiring systems, house building, nursing, farm management, ship sailing.

Definitions and Examples of GED Levels for Each Scale

The following work-activity descriptions, which illustrate the definition of each level of reasoning, mathematical, and language development, are intended to serve as examples to aid in using the Scales of GED to rate jobs. In some cases, coterminous levels of mathematical development (5 & 6) and language development (3 & 4) are covered by the same definition, but each level is illustrated by a separate group of examples to help distinguish between those levels.

Reasoning Development

Level 1

Apply common sense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.

R-1:1 Marks size, lot number, contents, or other identifying information or symbols on containers or directly on articles by placing stencil on object and brushing ink or paint across open lettering.

R-1:2 Covers dry-cleaned clothing and household articles with plastic bags, and sorts articles for route delivery. Hangs dry-cleaned articles on rail according to route number or color of dry-cleaning ticket.

R-1:3 Scans rags for hardware, such as buttons and snaps, and holds rags against rotating blade that cuts hardware from rags and cuts rags into specified size. Sorts rags into bins according to color and fabric.

R-1:4 Tends bandsaw that cuts wooden stock for toys and games. Stacks number of pieces of stock on cutting table against preset ripping fence. Pushes cutting table against saw until stock is severed. Drops cut pieces into tote box.

R-1:5 Feeds eggs into machine that removes earth, straw, and other residue from egg surface prior to shipment. Places eggs in holder that carries them into machine where rotating brushes or water spray remove residue. Removes cleaned eggs from discharge trough and packs them in cases for shipment.

Level 2

Apply common sense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.

R-2:1 Guards street crossing during school hours when children are going to and from school. Directs actions of children and traffic at street intersections to insure safe crossing. Records license numbers of vehicles disregarding traffic signals and reports them to police.

R-2:2 Delivers messages, documents, packages, and other items to offices or departments within establishments or to other business concerns, walking, using bicycle or motorcycle, or riding public conveyances.

R-2:3 Screws watch balances and balance bride assembly to pillar plate. Places pillar plate in holding fixture, and positions balance and bride assembly on plate, securing it with screws.

R-2:4 Tests balance for vertical play by gently moving it up and down with tweezers, determining from experience if shake is within acceptable limits. Touches oil-filled hypodermic needle to jewel to oil lower-balance jewel prior to assembling. Observes minute parts with aid of loupe and handles parts with tweezers.

R-2:5 Assists customer to launder or dry-clean clothes, using self-service equipment. Gives instructions to customer in clothes preparations, such as weighing, sorting, fog-spraying spots, and removing perishable buttons. Assigns machine and points out posted instructions regarding equipment operations.

Level 3

Apply common sense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables in or from standardized situations.

R-3:1 Operates cord or cordless switchboard to provide answering service for clients. Greets caller and announces name or phone number of client. Records and delivers messages, furnishes information, accepts orders, and relays calls. Places telephone calls at request of client or to locate client in emergencies. Files messages.

R-3:2 Requisitions transportation from motor, railroad, and airline companies to ship plant products. Reads shipping orders to determine quantity and type of transportation needed. Contacts company to make arrangements and to issue instructions for loading products. Annotates shipping orders to inform shipping department of loading locations and time of arrival of transportation.

R-3:3 Installs and adjusts television receivers and antennas, using handtools. Selects antenna according to type of set and location of transmitting station. Secures antenna in place with bracket and guy wire, observing insurance codes and local ordinances to protect installation from lightning and other hazards. Tunes receiver on all channels and adjusts screws to obtain desired density, linearity, focus, and size of picture.

R-3:4 Sets up and adjusts compression, injection, or transfer machines used to mold plastic materials to specified shape. Adjusts stroke of ram, using handtools. Connects steam, oil, or water lines to mold or regulates controls to adjust mold temperature. Sets machine controls to regulate forming pressure of machine and curing time of plastic in mold.

R-3:5 Cares for patients and children in private homes, hospitals, sanitariums, and similar institutions. Takes and records temperature, pulse, and respiration rate. Gives standard medications as directed by physician or nurse. Sterilizes equipment and supplies, using germicides, sterilizer, or autoclave. Prepares food trays, feeds patients, and records food and liquid intake and output.

Level 4

Apply principles of rational systems to solve practical problems and deal with a variety of concrete variables in situations where only limited standardization exists. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form.

R-4:1 Plans layout and installs and repairs wiring, electrical fixtures, apparatus, and control equipment. Plans new or modified installations according to specifications and electrical code. Prepares sketches showing locations of all wiring and equipment or follows diagrams or blueprints prepared by others. Tests continuity of circuit to insure electrical compatibility and safety of all components, using standard instruments, such as ohmmeter, battery, and oscilloscope.

R-4:2 Inspects internal combustion engine for conformance to blueprints and specifications, using measuring instruments and handtools. Reviews test data to locate assemblies and parts not functioning according to specifications. Measures dimensions of disassembled parts and assemblies, such as pistons, valves, bearings, and injectors, using scale, micrometers, special tools, and gaging setups. Compares measurements against specifications to locate faulty parts.

R-4:3 Draws and letters charts, schedules, and graphs to illustrate specified data, such as wage trends, absenteeism, labor turnover, and employment needs, using drafting instruments, such as ruling and lettering pens, T-squares, and straightedge.

R-4:4 Schedules appointments, gives information to callers, takes dictation, and relieves officials of minor administrative and business details. Reads and routes incoming mail. Composes and types routine correspondence. Greets visitors, ascertains nature of business, and conducts visitors to appropriate person.

R-4:5 Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution. Administers prescribed medications and treatments in accordance with approved techniques. Prepares equipment, and aids physician during treatments and examinations of patients. Observes, records, and reports to supervisor or physician patients' conditions, reactions to drugs, treatments, and significant incidents.

Level 5

Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Interpret an extensive variety of technical instructions, in books, manuals, and mathematical or diagrammatic form. Deal with several abstract and concrete variables.

R-5:1 Interviews persons with problems, such as personal and family maladjustment, lack of finances, unemployment, and physical and mental impairment, to determine nature and degree of problems. Obtains and evaluates patient data, such as physical, psychological, and social factors. Counsels patients individually or in groups and assists them to plan for solution of problems.

R-5:2 Studies clerical and statistical methods in commercial or industrial establishments to develop improved and standardized procedures. Consults supervisors and clerical workers to ascertain functions of offices or sections, methods used, and personnel requirements. Prepares reports on procedures and tasks of individual workers.

R-5:3 Interviews property holders and adjusts damage claims resulting from activities connected with prospecting, drilling, and production of oil and gas, and laying of pipelines on private property. Examines property titles to determine their validity, and acts as company agent in transactions with property owners. Investigates and assesses damage to crops, fences, and other properties, and negotiates claim settlements with property owners. Collects and prepares evidence to support contested damage in court.

R-5:4 Studies traffic conditions on urban or rural arteries from fixed position, vehicle, or helicopter to detect unsafe or congested conditions and to observe locations of alternative routes. Evaluates statistical and physical data supplied by engineering department regarding such considerations as vehicle count per mile, load capacity of pavement, feasibility of widening pavement, and projected traffic load in future.

R-5:5 Prepares and conducts inservice training for company personnel. Evaluates training needs in order to develop educational materials for improving performance standards. Performs research relating to course preparation and presentation. Compiles data for use in writing manuals, handbooks, and other training aids. Develops teaching outlines and lesson plans, determines content and duration of courses, and selects appropriate instructional procedures, based on analysis of training requirements for company personnel.

Level 6

Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Comprehend the most abstruse classes of concepts.

R-6:1 Designs and conducts experiments to study problems in human and animal behavior. Formulates hypotheses and experimental designs to investigate problems of growth, intelligence, learning, personality, and sensory processes. Selects, controls, and modifies variables in laboratory experiments with humans and animals. Analyzes data and evaluates its significance in relation to original hypotheses.

R-6:2 Reconstructs records of extinct cultures, especially preliterate cultures. Studies, classifies, and interprets artifacts, architectural features, and types of structures to determine their age and cultural identity. Establishes chronological sequence of development of each culture from simpler to more advanced levels.

R-6:3 Arbitrates, advises, and administers justice in a court of law. Establishes rules of procedures on questions for which standard procedures have not been established by law or by a superior court. Examines evidence in criminal cases to determine if charges are true or to determine if evidence will support charge. Instructs jury on application of facts to questions of law.

R-6:4 Interprets results of experiments in physics, formulates theories consistent with data obtained, and predicts results of experiments designed to detect and measure previously unobserved physical phenomena. Applies mathematical methods to solution of physical problems.

R-6:5 Plans, organizes, and conducts research for use in understanding social problems and for planning and carrying out social welfare programs. Develops research designs on basis of existing knowledge and evolving theory. Constructs and tests methods of collecting data. Collects information and makes judgments through observation and interviews, and review of documents. Analyzes and evaluates data. Interprets methods employed and findings to individuals within agency and community.

Mathematical Development

Level 1

Perform simple addition and subtraction, reading and copying of figures, or counting and recording. Perform operations with units, such as cup, pint, and quart; inch, foot, and yard; and ounce and pound.

M-1:1 Transfers hog-back skins from vat to grading table and measures size and length of skin on graduated board. Separates skins according to size.

M-1:2 Records price, name of buyer, and grade of tobacco on tickets attached to piles of tobacco as tobacco is auctioned to highest bidder.

M-1:3 Counts number of words in telegram dispatched from telegraph office, consults rate in rate book, and marks changes on duplicates of message for use in billing customers.

M-1:4 Redeems books of trading stamps or coupons in exchange for merchandise. Counts books and verifies number of coupons required for requested articles.

M-1:5 Tallies field crops received from workers, for payroll purposes. Adds and records totals of tallied figures.

M-1:6 Subtracts number of illegibly addressed or mutilated packages from total delivered to loading dock and records number of packages shipped.

Level 2

Use arithmetic to add, subtract, multiply, and divide whole numbers.

M-2:1 Sells cigars, cigarettes, corsages, and novelties to patrons in hotels, nightclubs, and restaurants. Figures cost of items sold, collects cash, and makes change.

M-2:2 Measures width of pleats in women's garments, using yardstick. Counts number of pleats in garment and multiplies number by price per pleat to determine service charge for cleaning garment.

M-2:3 Drives truck to transport materials to specified destinations, such as railroad stations, factories, or residences. Calculates amount of bill and delivery charge, collects payment for goods delivered, and makes change as necessary.

M-2:4 Receives cash from customers in payment for goods or services. Computes or recomputes bill, itemized lists, and tickets showing amount due, using adding machine or cash register. Makes change, cashes checks, and issues receipts to customers.

M-2:5 Computes cost of customer's laundry by pricing each item on customer's list, using adding machine, calculating machine or comptometer. Prepares statements to be sent to customers.

Level 3

Make arithmetic calculations involving fractions, decimals, and percentages.

M-3:1 Keeps record of accruing dividends on insurance policies and calculates and records interest due on them, using adding machine, calculator, statistical manuals, and rate tables.

M-3:2 Measures, marks, and cuts carpeting and linoleum with knife to get maximum number of usable pieces from standard-size rolls, following floor dimensions or diagrams.

M-3:3 Operates billing machine with or without computing devices to prepare bills and invoices to be sent to customers. Calculates totals, net amounts, and discounts by addition, subtraction, and multiplication, and records computations.

M-3:4 Verifies and balances entries and records of financial transactions reported by various hotel departments during day, using adding, bookkeeping, and calculating machines.

M-3:5 Scans objective-type examination papers and computes and records test grades and averages of students in schools. Grades papers, using electric marking machine. Totals errors found and computes and records percentage grades on students' grade cards. Averages test grades to compute students' grades for course.

Level 4

Perform arithmetic, algebraic, and geometric procedures in standard, practical applications, such as shop math and accounting.

M-4:1 Directs and coordinates activities of workers engaged in keeping accounts and records. Prepares balance sheets to reflect company's assets, liabilities, and capital. Prepares profit and loss statements for specified accounting period.

M-4:2 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of mechanics, shop mathematics, metal properties, and layout and machining procedures.

M-4:3 Calculates latitude, longitude, angles, areas, and other information for mapmaking from field notes secured by engineering survey party, using reference tables and calculating machine or computer.

M-4:4 Examines airplane tool drawings made by Tool Designer for inaccuracies of detail and to determine production feasibility of design. Reviews drawing details, such as dimensions, angles, allowances, and shop notes for errors, guided by specifications on engineering drawing and knowledge of mathematics and drafting.

M-4:5 Inspects flat glass and compiles defect data based on samples to determine variances from acceptable quality limits. Calculates standard control tolerances for flat glass, using algebraic formulas, plotting curves, and drawing graphs.

Level 5

Apply knowledge of advanced mathematical and statistical techniques, such as differential and integral calculus, factor analysis, and probability determination, and make original applications of mathematical procedures, as in empirical and differential equations.

M-5:1 Plans survey and collects, organizes, interprets, summarizes, and analyzes numerical data on sampling or complete enumeration bases. Evaluates reliability of sources of data, adjusts and weighs raw data, and organizes and summarizes data into tabular forms amenable to analysis of variance and principles of statistical inference.

M-5:2 Develops, fabricates, assembles, calibrates, and tests electronic systems and components used in aircraft and missile production, and testing operations. Establishes circuit layout dimensions, by mathematical calculations and principles.

M-5:3 Applies knowledge of mathematics, probability, statistics, principles of finance and business to problems in life and health insurance, annuities, and pensions. Constructs probability tables regarding fire, natural disasters, and unemployment, based on analysis of statistical data and other pertinent information.

M-5:4 Applies principles of accounting to install and maintain general accounting system. Designs new system or modifies existing system to provide records of assets, liabilities, and financial transactions of establishment.

M-5:5 Plans, designs, conducts, and analyzes results of experiments to study problems in human and animal behavior. Analyzes test results, using statistical techniques, and evaluates significance of data in relation to original hypothesis.

Level 6

Same as Level 5 except that mathematics is of a higher level and more complex, leaning more toward the theoretical application.

M-6:1 Conducts and oversees analyses of aerodynamic and thermodynamic systems and aerophysics problems to determine suitability of design for aircraft and missiles. Establishes computational procedures for and methods of analyzing problems.

M-6:2 Analyzes physical systems, formulates mathematical models of systems, and sets up and operates analog computer to solve scientific and engineering problems. Prepares mathematical model, applying principles of advanced calculus and differential equations.

M-6:3 Observes and interprets celestial phenomena and relates research to basic scientific knowledge or to practical problems, such as navigation. Studies celestial phenomena, determines sizes, shapes, brightness, spectra, and motions, and computes positions of sun, moon, planets, stars, nebulas, and galaxies.

M-6:4 Conducts research in fundamental mathematics and solves or directs solutions to problems in research, development, production, and other activities by mathematical methods. Conceives and develops ideas for application of mathematics, such as algebra, geometry, number theory, logic, and topology.

M-6:5 Conducts research into phases of physical phenomena, develops theories and laws on basis of observation and experiments, and devises methods to apply laws and theory of physics to industry, medicine, and other fields. Describes and expresses observations and conclusions in mathematical terms.

Language Development

Level 1

Comprehension and expression at a level to: learn job duties from oral instructions or demonstrations; write identifying information, such as name and address of customer, weight, number, or type of product, on tags or slips; and request orally, or in writing, such supplies as linen, soap, or work materials.

L-1:1 Delivers telephone directories to residences and business establishments, following oral instructions or address list.

L-1:2 Counts novelty case parts to verify amount specified on work ticket and stacks and bundles parts prior to spraying.

L-1:3 Sorts finished garments, such as shirts, dresses, and pajamas, according to lot and size numbers recorded on tags and labels attached to garments.

L-1:4 Pushes television camera dolly around studio, as directed by Television Camera Operator, to follow action of scene being televised.

L-1:5 Marks and attaches price tickets to articles of merchandise to record price and identifying information. Writes selling price by hand on boxes containing merchandise, or on price ticket.

L-1:6 Receives and delivers articles to customers remaining in cars outside dry-cleaning store or plant. Writes tickets to identify and to indicate work to be done.

L-1:7 Tends machine that interleafs rolls of carbon and copy paper and winds interleafed paper into rolls of specified length. Reads work order to determine size and type carbon and copy paper to be processed.

Level 2

Comprehension and expression at a level to: file, post, and mail such material as forms, checks, receipts, and bills; copy data from one record to another, fill in report forms, and type all work from rough draft or corrected copy; interview members of household to obtain such information as age, occupation, and number of children, to be used as data for surveys, or economic studies; and guide people on tours through historical or public buildings, describing such features as size, value, and points of interest.

L-2:1 Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy.

L-2:2 Interviews motor vehicle drivers at specified road intersection to secure information for use in highway planning. Signals driver to stop and explains reason for halting vehicle. Questions driver to obtain data, such as itinerary and purpose of trip. Records results of interview.

L-2:3 Escorts group of people through industrial establishment, describes features of interest, and explains various processes and operation of machines. Answers questions and supplies information on work.

L-2:4 Mails letters, merchandise samples, and promotional literature to prospective customers. Receives requests for samples and prepares required shipping slips. Maintains files and records of customer transactions.

L-2:5 Serves food to patrons at counters and tables of coffee shops, lunchrooms, and other dining establishments. Presents menu, answers questions, and makes suggestions regarding food and services.

L-2:6 Classifies materials according to subject matter and assigns numbers or symbols from predetermined coding system to facilitate accurate filing and reference.

L-2:7 Drives truck over established route to deliver and sell products or services. Calls on prospective customers to solicit new business. Informs customers of new products or services.

L-2:8 Keeps records of group insurance policies covering company employees and dependents. Writes data on application blanks or verifies data on blanks submitted by employees.

L-2:9 Files correspondence, cards, invoices, receipts and other records in alphabetical or numerical order, or according to subject matter. Reads incoming material and sorts according to file system.

Level 3

Comprehension and expression at a level to: transcribe dictation; make appointments and handle personal mail for executives; interview and screen people wishing to make appointments; write form letters or routine correspondence on own initiative; interpret written work instructions; and interview job applicants.

L-3:1 Performs secretarial duties utilizing knowledge of medical terminology and hospital, clinic, or laboratory procedures. Compiles and records medical charts and correspondence.

L-3:2 Interviews applicants to obtain such information as work experience, education, training, and occupational interests to select persons meeting employer's specifications.

L-3:3 Inspects and tests storage batteries in process of manufacture to verify conformity with specifications. Records inspection and test results, compares them with specifications and writes reports for use in correcting manufacturing defects.

L-3:4 Investigates continued absences of pupils from public schools to determine if such absences are lawful and known to parents.

L-3:5 Assists applicants to complete application forms for unemployment compensation.

Level 4

Same as Level 3 except that original correspondence is composed, knowledge of technical manuals is required, and more contact with people is involved.

L-4:1 Repairs and overhauls automobiles, buses, trucks and other automotive vehicles. Plans work procedures, using charts, layouts, manufacturers' manuals, and experience.

L-4:2 Compiles lists of prospective customers to provide leads to sell insurance. Contacts prospective customers, explains features of policies, and recommends amount and type of coverage, based on analyses of prospect's circumstances.

L-4:3 Composes letters in reply to correspondence concerning such items as requests for merchandise, damage claims, credit information, or to request other information. Reads incoming mail, types or dictates reply, or selects and completes answering letters.

L-4:4 Fits and assembles components according to assembly blueprints, technical manuals, engineering memos, sketches, and knowledge of machine construction to build, rebuild and repair machines and equipment.

L-4:5 Verifies completion of industrial orders and conformance of product to specifications. Compares blueprints with contract or order to ascertain that product meets engineering specifications. Communicates with customer to verify delivery of product.

Level 5

Comprehension and expression at a level to: report, write, or edit articles for such publications as newspapers, magazines, and technical or scientific journals; prepare and draw up deeds, leases, wills, mortgages, and contracts; prepare and deliver lectures on politics, economics, education, or science; interview, counsel, or advise such people as students, clients, or patients, in such matters as welfare eligibility, vocational rehabilitation, mental hygiene, and marital relations; and evaluate technical engineering data to design buildings and bridges.

L-5:1 Introduces various types of radio and television programs, interviews guests, and acts as master of ceremonies. Describes public events, such as parades and conventions, and reads news flashes and advertising copies during broadcasts.

L-5:2 Directs editorial activities of newspaper and negotiates with production, advertising, and circulation department heads. Confers with editorial policy committee and negotiates with department heads to establish policies and reach decisions affecting publications.

L-5:3 Teaches one or more subjects, such as economics, chemistry, law, or medicine, within a prescribed curriculum. Prepares and delivers lectures to students. Reviews current literature in field of study. Writes articles for publication in professional journals.

L-5:4 Writes service manuals and related technical publications concerned with installation, operation, and maintenance of electronic, electrical, mechanical and other equipment.

L-5:5 Plans, organizes, and conducts research for use in understanding social problems and for planning and carrying out social welfare programs. Constructs and tests methods of data collection. Collects, analyzes, and evalutes data. Writes reports containing descriptive, analytical and evaluative content, interprets methods employed, and submits findings to individuals with agency and community.

L-5:6 Assists legal representatives in preparation of written contracts covering other than standardized agreements. Reviews agreement for conformity to company rates, rules, and regulations. Writes agreement in contractual form and obtains necessary legal department approval.

CHAPTER 10

JOB TRAINING TIME (JTT) AND SPECIFIC VOCATIONAL PREPARATION (SVP)

Page

Estimating Job Training Time 247

Definitions of the Categories of Job-Training Requirements 248

Converting JTT to SVP 252

Scale of Specific Vocational Preparation 252

CHAPTER 10

JOB TRAINING TIME (JTT) AND SPECIFIC VOCATIONAL PREPARATION (SVP)

Job Training Time (JTT) is the usual amount of time spent by the average worker (i.e., one who has the typical attributes and capabilities required for the job being studied) in acquiring information, learning the techniques, and developing the facility for acceptable performance in a specific job, occupation, or field of work. JTT is expressed in terms of days, weeks, or months and is also assigned a Specific Vocational Preparation (SVP) rating based on the Scale of SVP on page 252.

Estimating Job Training Time

JTT is estimated by totaling the length of time necessary for completion of one or more of the following common training requirements:

- High school courses.
- Vocational courses.
- College courses.
- Apprenticeship programs.
- Inplant classroom instruction.
- On-the-job training.
- Performance on related jobs.

Other ways by which workers acquire skills, knowledges, and abilities which may be vocationally significant for certain jobs include self-instruction, home and leisure activities, driving skills, and geographic knowledge. Because there is no standardized manner by which to estimate the time of such requirements, they are not regarded as part of the total JTT estimate.

In cases where there are alternate kinds or combinations of training requirements for a job, the most common requirements (those met by a majority of workers) should be regarded as the total JTT for the job, and the others shown as alternate training requirements. Alternate training requirements may involve a shorter or longer length of time than the most common training requirements. When alternate training requirements are about equally common, or when there is insufficient information as to which are most usual, select the shortest JTT estimate. If two or more training requirements run concurrently, the shorter requirement(s) should not be added to the total JTT estimate.

Sources for Determining Job Training Time

Estimates of the types of training requirements and the amount of training time for a specific job should be based on information received from establishment officials who supervise, direct, or are otherwise knowledgeable about a worker's job performance. Such officials may include hiring officials, supervisors, department heads, training officers, and personnel staff. Workers themselves may also be able to provide reliable estimates of the length of time required to perform the job acceptably. Production, training, and worker-evaluation records and reports are also important sources of data on JTT. The analyst's final estimate of JTT should be based on evaluation and synthesis of data from as many reliable sources as possible.

Definitions of the Categories of Job-Training Requirements

After each definition is an explanation of the basis for estimating the length of JTT for that requirement, and an example of estimating JTT of a job for which that requirement is involved.

High School Courses: High school courses and programs, such as metal shop, art, auto mechanics, and typing. The JTT estimate for this requirement is based on the equivalent length of job experience that the employer would be willing to substitute for, or feels is equivalent to, the high school course or courses.

Example: Most Dry-Wall Finisher trainees hired by the Supreme Construction Corporation are required to have at least one high school woodworking course and are given 6 months of on-the-job training. The company will sometimes accept trainees who have not taken a woodworking course, but requires an additional 3 months of on-the-job training. JTT is estimated as follows:

	Usual JTT	
High school courses:	Woodworking	3 months
On-the-job training:		6 months
Total JTT		9 months
	Alternate JTT	
On-the-job training:		9 months
Total JTT		9 months

Vocational Courses: Courses and programs at post-secondary technical and vocational schools in specific fields of study, such as cosmetology, welding, stenography, and commercial art. The JTT estimate for this requirement is based on the usual length of time required to complete the course or program on a full-time basis (i.e., if a vocational course takes 6 months if attended full-time in day sessions and 12 months if taken part-time in the evening, the JTT for this requirement is 6 months, regardless of whether a majority of workers attended full- or part-time).

Example: City Hospital generally requires that applicants for Operating-Room Technician have completed a 1-year Surgical Technician certificate course in technical school and undergo 3 months of on-the-job training. The hospital fills a small percentage of these openings with some of its own Nursing Aides who have at least 2 years of experience and who then receive 6 months of on-the-job training, the first 8 weeks of which include 15 hours per week of inplant training. JTT is estimated as follows:

	Usual JTT	
Vocational courses:	Surgical Technician	12 months
On-the-job training:		3 months
Total JTT		15 months
	Alternate JTT	
Inplant training (concurrent):		8 weeks
On-the-job training (concurrent):		6 months
Performance on related jobs:	Nursing Aide	24 months
Total JTT		30 months

College Courses: Vocationally focused programs, courses, and degrees from universities, colleges, and junior colleges. The average 4-year college curriculum, in such fields as business administration, education, accounting, pre-law, pre-medicine, psychology, and engineering, should be regarded as being equivalent to 2 years of JTT. Nonvocationally focused curriculums, such as English and political science, are not counted toward JTT. Each year of graduate school is equivalent to 1 year of JTT; similarly, each year of an associate degree program is equivalent to 1 year of JTT.

Example: Employment Counselors are required by an employer to have completed 4 years of college, with a major in Psychology or related field, *and* either have a 2-year master's degree in Counseling *or* 1 year of experience as an Employment Interviewer. A majority of applicants hired are Employment Interviewers who do not have master's degrees. In either case, 6 months of on-the-job training is required. JTT is estimated as follows:

Usual JTT

College courses:	4-year bachelor's degree	24 months
Performance on related jobs:	Employment Interviewer	12 months
On-the-job training:		6 months
Total JTT		42 months

Alternate JTT

College courses:	4-year bachelor's degree	24 months
	2-year master's degree	24 months
On-the-job training:		6 months
Total JTT		54 months

Apprenticeship: Formal apprenticeship programs established for specific occupations and recognized by Federal or State apprenticeship bureaus. The JTT estimate for this requirement is based on the minimum formal length of the program for the job studied. Although many apprenticeship programs seem to run longer than the point at which the worker achieves average job performance, the full length of the program must be counted as JTT because the worker is not considered to be fully qualified until it is completed.

Example: The AZ Machine Company obtains most of its Tool-and-Die Maker Apprentices by hiring graduates of a local vocational high school who have completed a 2-year program of machine-shop courses. Some apprentices are hired without the vocational-high-school background if they have 1 year of machine-shop experience as a Machine-Tool Operator with knowledge of blueprints, machine setup, and use of micrometer, background that the company feels is equivalent to the high school program. JTT is estimated as follows:

Usual JTT

High school courses:	machine shop (2-year program)	12 months
Apprenticeship:	4-year Tool-and-Die Maker	48 months
Total JTT		60 months

Alternate JTT

Apprenticeship:	4-year Tool-and-Die Maker	48 months
Performance on related jobs:	Machine-Tool Operator	12 months
Total JTT		60 months

Inplant Training: Job-related classroom instruction provided by the employer, usually at the establishment. Does not include general orientation classes. The JTT estimate for this requirement is based on the length of time of the training sessions.

Example: Inplant classroom instruction frequently runs concurrently with on-the-job training, such as where workers receive 2 hours per day classroom training and 6 hours per day on-the-job training for a period of 2 months, after which the on-the-job training continues for an additional 4 months. In such cases, the JTT is estimated as follows:

Usual JTT

Inplant training — 2 months (2 hours per day) (concurrent):	2 months
On-the-job training (concurrent):	6 months
Total JTT	6 months

On-the-Job Training: Training provided at a job site by qualified workers and supervisors to enable the worker to attain the level of proficiency required by company standards. The JTT estimate for this requirement is based on the average length of on-the-job training required for workers at the establishment, according to the estimates of supervisors, managers, training officials, and other knowledgeable persons. When estimates of establishment personnel appear to be out of line with the facts presented in the job analysis, make a more reasonable estimate of this requirement based on evaluation of all pertinent data gathered; only the analyst's estimate will count as JTT. Because the length of on-the-job training is affected by the standards of an establishment, the same occupation found in different establishments may vary in terms of the quality and quantity of work expected of qualified workers.

Example: An analyst studying the job of Toy Assembler receives different estimates of the length of on-the-job training — the only JTT requirement. Supervisors of Departments A, B, and C respectively, estimate that average workers require 2, 4, and 3 weeks to learn the job to the point that they are considered to be qualified, but that most workers reach acceptable quantitative production after about one week. This situation is clarified, however, when it is revealed that although the quantity of work produced reaches acceptable levels after one week, the number of pieces rejected by quality-control personnel does not reach acceptable levels until after the periods estimated by the supervisors, which vary because of the different types of toys produced in each department. In consolidating all JTT data, the analyst estimates JTT as follows:

Usual JTT

On-the-job training:	2-4 weeks, depending on department (3 weeks average)
Total JTT	3 weeks

Performance on Related Jobs: Related jobs are jobs, at the same or other establishments, or in military service, in which the worker can acquire skills, knowledges, and abilities which reduce the amount of on-the-job training otherwise required for the job being studied. The JTT estimate for this requirement is based on the minimum length of experience required in one or more related jobs. As in the case of on-the-job training, the analyst may disagree with establishment personnel as to whether the job in which experience is required is actually related to the job being studied and/or whether the length of required experience is reasonable in terms of the job analysis. Again, both estimates, if divergent, should be noted, but only the analyst's estimate counts toward JTT. Another consideration in estimating this requirement is the JTT requirements for related jobs.

Example: An analyst studying the job of Class A Assembler is informed that in addition to 6 months of on-the-job training, 1 year of experience as a Class B Assembler is required, which seems to be reasonable. Further investigation indicates that Class B Assemblers are promoted from the entry job, Class C Assembler, in which 3 months of experience is required. The total JTT for Class A Assembler is estimated as follows:

Usual JTT

Performance on related jobs:		
Class B Assembler	(12 months)	
Class C Assembler	(3 months)	15 months
On-the-job training:		6 months
Total JTT		21 months

Converting JTT to SVP

For reporting purposes, the JTT estimate is converted to a level of SVP based on the scale below. Further instructions appear on page 378.

Scale of Specific Vocational Preparation

Level	Time
1	Short demonstration only
2	Anything beyond short demonstration up to and including 30 days
3	Over 30 days up to and including 3 months
4	Over 3 months up to and including 6 months
5	Over 6 months up to and including 1 year
6	Over 1 year up to and including 2 years
7	Over 2 years up to and including 4 years
8	Over 4 years up to and including 10 years
9	Over 10 years

CHAPTER 11

APTITUDES

Page

Level of Aptitudes 256

Estimating the Aptitude Requirements of Jobs 256

Definitions of the Aptitudes, Interpretive Information,
Levels, and Examples 257

- G - General Learning Ability 257
- V - Verbal Aptitude 263
- N - Numerical Aptitude 269
- S - Spatial Aptitude 275
- P - Form Perception 280
- Q - Clerical Perception 284
- K - Motor Coordination 289
- F - Finger Dexterity 293
- M - Manual Dexterity 297
- E - Eye-Hand-Foot Coordination 301
- C - Color Discrimination 305

CHAPTER 11

APTITUDES

Aptitudes are the specific abilities required of an individual to perform a given work activity. There are 11 aptitudes used by the United States Employment Service for job analysis, nine of which are taken directly from the USES's General Aptitude Test Battery (GATB).[1] Two others, Eye-Hand-Foot Coordination and Color Discrimination, have been added because they are thought to be occupationally significant, even though measures for these aptitudes have not yet been developed for the GATB. The 11 aptitudes are:

G - General Learning Ability

V - Verbal Aptitude

N - Numerical Aptitude

S - Spatial Aptitude

P - Form Perception

Q - Clerical Perception

K - Motor Coordination

F - Finger Dexterity

M - Manual Dexterity

E - Eye-Hand-Foot Coordination

C - Color Discrimination

Decades of research have established the validity of the GATB in measuring the aptitudes of individuals. The USES job analysis technique of estimating the aptitude requirements of jobs has its basis not only in the GATB aptitude definitions but in USES test development standards as well. In developing specific aptitude test batteries (SATB's) for selected occupations, Test Research Analysts apply precise statistical and other quantitative as well as qualitative standards and procedures to determine test norms in terms of "cutting scores" (*minimum* scores for the two to four aptitudes validated for use as selection criteria).

---

[1] *Manual for the USTES General Aptitude Test Battery, Sec. III: Development* (Washington: U.S. Department of Labor, 1970).

Levels of Aptitudes

In job analysis, aptitude estimates are useful as analytical and descriptive tools and can be expressed in terms of the following levels, which reflect the amount of the aptitudes possessed by segments of the working population:

1. *The top 10 percent of the population*
   This segment of the population possesses an extremely high degree of the aptitude.

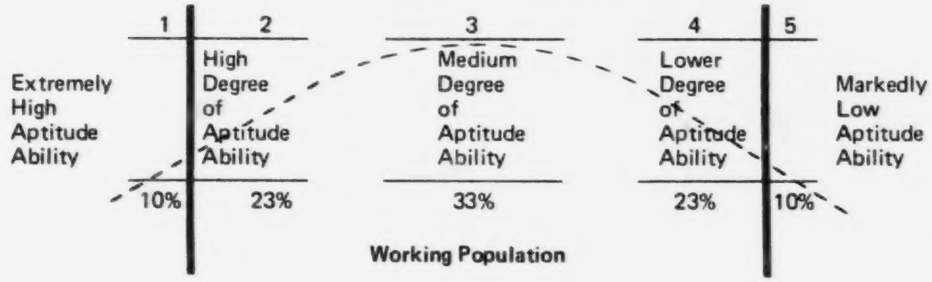
2. *The highest third exclusive of the top 10 percent of the population*
   This segment of the population possesses an above average or high degree of the aptitude.

3. *The middle third of the population*
   This segment of the population possesses a medium degree of the aptitude, ranging from slightly below to slightly above average.

4. *The lowest third exclusive of the bottom 10 percent of the population*
   This segment of the population possesses a below average or low degree of the aptitude.

5. *The lowest 10 percent of the population*
   This segment of the population possesses a negligible degree of the aptitude.

FIGURE 1
Aptitude Levels 1 through 5


1
2
3
4
5
Extremely High Aptitude Ability
High Degree of Aptitude Ability
Medium Degree of Aptitude Ability
Lower Degree of Aptitude Ability
Markedly Low Aptitude Ability
10%
23%
33%
23%
10%
Working Population

Estimating the Aptitude Requirements of Jobs

Every aptitude factor must be considered independently in the rating process for each job. The analyst estimates the level of each aptitude required of the worker for average, satisfactory performance, based on a careful evaluation of the work activities of the job and the specific worker abilities which can be identified in terms of the aptitudes. Then the appropriate aptitude level number is assigned. If the aptitude is determined to be *not* *present*, the symbol "X" is used, rather than a level number. Certain of the aptitudes can be identified through study of the physical actions which the worker performs, such as Motor Coordination, Finger Dexterity, and Eye-Hand-Foot Coordination; other aptitudes, such as Spatial, Numerical, and General Learning Ability, are identified by considering worker judgments and other mental processes involved in performing the job satisfactorily. Aptitude levels are determined by comparing the tasks of the job with the aptitude definitions, interpretive information, and the examples of work activities shown for each level, which appear in the next section of this chapter. If there is a doubt as to which of two levels should be assigned, select the lower level.

After estimating the level of each aptitude, the analyst should then estimate which of the aptitudes are more important to the job. Important aptitudes are those without which the main purpose of the job cannot be accomplished and which are consequently required for successful job performance. An aptitude is not rated "important" if it is present only in an incidental, insignificant, or occasional task. The analyst will likely find from three to six important aptitudes in every job.

Definitions of the Aptitudes, Interpretive Information, Levels, and Examples

The definition of each aptitude is followed by "interpretive information for analysts," which provides supplementary information relating the definition to specific work activities, and examples of job or task summaries illustrating each of the five levels of the aptitude. The definitions reflect the aptitudes as seen in people. The interpretive information reflects the aptitudes as observed in jobs. Most of the examples are based on the qualitative analyses contained in the technical reports of the SATB's.

G- **GENERAL LEARNING ABILITY:** The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school.

Interpretive Information for Analysts: Consider such factors as: work requiring the ability to define problems, collect information, establish facts, and draw valid conclusions; using logic or scientific thinking to solve a variety of problems; using measurable and verifiable information for making decisions or judgments; understanding detailed work procedures; planning, organizing, coordinating, and directing own work and that of others; copying with a variety of duties; following written or oral instructions; or selecting appropriate work aids and materials to perform a set of tasks.

Level 1

G-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management and other fields by mathematical methods:

General learning ability is required to understand meanings and relationships of mathematical symbols, formulas, and concepts; to assimilate background information required to understand problems from various fields; to develop or apply appropriate methods and procedures for solving problems; and to present solutions or methodologies for solutions in logical and systematic forms and sequences.

G-1:2 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:

General learning ability is required to understand and apply principles of dental anatomy, bacteriology, and physiology for diagnosis and treatment, and to use techniques of dental restoration, and prosthetics. Must understand the operation and function of dental tools and equipment; and the uses of dental metals, alloys, and amalgams.

G-1:3 Converts symbolic statements of administrative data or business problems to detailed logical flow charts for coding into computer language:

General learning ability is required to understand and apply work statement instructions, recommended procedural routines, and related informational data; to identify and organize elements of a problem into logical sequence for computer operation by means of preparing block diagrams and flow charts; to make analytical and logical analyses in planning procedural routines; to have a working knowledge of the company business organization and management and with modern office methods and procedures; and to have a complete familiarity with programing principles and techniques in order to discuss programing methods, requirements, and approaches with line and staff personnel.

G-1:4 Writes original plays, such as tragedies, comedies, or dramas, or adapts themes from fictional, historical, or narrative sources, for dramatic presentation:

General learning ability is required to utilize basic principles of playwriting, including basic research of characters, dress, and furnishings of the time-setting of the play, and to show depth of understanding in the development of situations and roles.

G-1:5 Receives individual applications for insurance to evaluate degree of risk involved and accepts applications, following company's underwriting policies:

General learning ability is required to understand and apply principles of insurance, finance, and economics. Must be able to understand application of information, such as medical reports, occupational hazards, financial reports, fire inspection reports, and insurance maps. Must work with actuarial formulas, study and relate all phases of an insurance risk problem, and come to a decision beneficial to the needs of the applicant and to the interests of the company.

G-1:6 Studies origin, relationship, development, anatomy, functions, and other basic principles of plant and animal life:

General learning ability is required to study scientific facts and concepts which are needed for an understanding of the structure, function, development, and relationship of living organisms, and to draw conclusions or generalizations from accumulated facts.

G-1:7 Coordinates activities of radio and television studio and control-room personnel to insure technical quality of pictures and sound for programs originating in studio or from remote pickup points:

General learning ability is required to plan and arrange for all audio, visual, and special effects equipment and technical personnel needed for programs; to use judgment to determine number of cameras, etc., necessary to achieve specified effects; and to give work assignments to technicians who control and maintain lights, audio and visual controlling equipment, microphones, and cameras. Must understand functions and capabilities of equipment to give directions.

Level 2

G-2:1 Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution (Registered Nurse):

General learning ability is required to learn and apply principles of anatomy, physiology, microbiology, nutrition, psychology, and patient care used in nursing; to recognize and interpret symptoms and reactions; to make independent judgments in the absence of doctor; and to determine methods and treatments to use when caring for patients with varying illnesses or injuries.

G-2:2 Applies principles of accounting to devise and implement system for general accounting:

General learning ability is required to learn, understand, and apply accounting principles and procedures; to evaluate accounting and record keeping systems; to analyze current and regulatory problems and develop system which provides needed records for internal operation and to meet requirements of government agencies; and to prepare analyses and interpretation of data for company officials.

G-2:3 Plans layout, installs, and repairs wiring, electrical fixtures, apparatus, and control equipment:

General learning ability is required to learn and understand principles of electricity; to read and interpret blueprints and specifications; to plan new or modified installations; and to diagnose problems and select the most feasible methods of repair.

G-2:4 Rents, buys, and sells property for clients on commission basis:

General learning ability is required to learn and make proper interpretation and application of law, legislation, and qualification requirements; and to keep informed of marketing conditions and property values.

G-2:5 Analyzes a variety of specifications, lays out metal stock, sets up and operates machine tools, and fits and assembles parts to make and repair metalworking dies, cutting tools, jigs, fixtures, gages, and machinists' handtools, applying knowledge of tool and die design and construction, shop mathematics, metal properties, and layout, machining, and assembly procedures:

General learning ability is required to understand blueprints and other specifications; to plan sequence of operations and layout and setup procedures; to determine type of machine and tools to use and machine settings based on type of operations to be performed, type of material being processed, and dimensions and other specifications to be achieved.

G-2:6 Draws and corrects topographical maps from source data, such as surveying notes, aerial photographs, or other maps:

General learning ability is required to learn and apply drafting principles, procedures, and symbols and the geometry and mathematics peculiar to topography, and to translate aerial photographs and other data into accurate maps.

G-2:7 Prepares bodies for interment in conformity with legal requirements:

General learning ability is required to learn and apply basic principles and techniques related to mortuary science including chemistry, anatomy, physiology, principles of preservation, disinfection, circulatory embalming, cavity treatment, hygiene, microbiology, restoration, and cosmetics; and to learn the laws and regulations relating to embalming.

Level 3

G-3:1 Takes dictation in shorthand of correspondence, reports, and other matters, and transcribes dictated material, using typewriter:

General learning ability is required to learn meaning and usage of shorthand symbols; to learn typewriter operation and memorize keyboard; to learn rules for format of business letters and reports and rules of spelling, punctuation, and grammar.

G-3:2 Repairs, maintains, and installs electrical systems and equipment such as motors, transformers, wiring, switches, and alarm systems:

General learning ability is required to learn basic electrical theory and circuitry, blueprint reading, local building codes, and safety practices; and to use reason and judgment in diagnosing faults and choosing most feasible method of repair.

G-3:3 Prepares and compiles records in hospital nursing unit, such as obstetrics, pediatrics, or surgery:

General learning ability is required to make independent judgments regarding task priorities; to integrate and interpret informational and situational data; and to respond quickly to data input.

G-3:4 Drives truck over established route to deliver, sell, and display products or render services:

General learning ability is required to acquire and use knowledge of company products or services, unit cost, and policies; to discuss customer's needs and promote sales; to apply company policies and own judgment regarding delivery procedures, credit extension, discounts, etc., in a manner to maintain good customer relations; to maintain accounts and records; and to determine best driving routes to reach customers.

G-3:5 Assembles and loads a variety of solid-propellant rocket motors:

General learning ability is required to learn the various steps in preparing and loading solid propellant fuels for rockets; to understand specifications and follow them explicitly when mixing liquid and dry ingredients to form propellant; to use judgment when handling and processing propellant to avoid explosions; to determine when chemicals are properly mixed and cured from instrument readings on control panel, and using charts and direct observation via TV monitors.

G-3:6 Cares for ill, injured, convalescent, and handicapped persons in hospitals, clinics, private homes, sanitariums, and similar institutions (Licensed Practical Nurse):

General learning ability is required to learn and apply principles and techniques of basic nursing skills, body structure and functions, personal hygiene, nutrition, and first aid; and to use judgment in patient care, moving patients, and giving prescribed medicines and injections.

G-3:7 Provides beauty services for customers:

General learning ability is required to learn the various phases of cosmetology including hair cutting, styling, setting, and facial treatment, and the various methods used; to use reason and judgment to suggest various treatments to customers and assist them in deciding on hair style according to their individual features and taste.

Level 4

G-4:1 Assists in care of hospital patients, under direction of nursing and medical staff:

General learning ability is required to learn patient care and handling and hospital routine; to understand and carry out orders correctly; to use reason and judgment in handling patients, noting patient's condition and reporting symptoms or reactions which may indicate a change in condition.

G-4:2 Makes women's garments, such as dresses, coats, and suits, according to customer specifications and measurements:

General learning ability is required to understand basic principles of garment construction and pattern alteration; to understand instructions from customers and patterns; and to reason when altering patterns to customers' measurements.

G-4:3 Sorts agricultural produce, such as bulbs, fruits, nuts, and vegetables, according to grade, color, and size, discards cull items and foreign matter, and places produce in containers:

Recognizes indications of defects, such as spots or softness, and learns grading characteristics for a variety of produce. Uses judgment in sorting out partially defective produce.

G-4:4 Feeds or removes metal stock from automatic fabricating machines:

Learns work routine, acceptable tolerances, and difference between acceptable imperfections and those to be rejected. Uses judgment to determine, from observing parts processed or machine operation, when machine should be stopped because of some malfunction.

G-4:5 Operates alphabetic and numeric keypunch machine, similar in operation to electric typewriter, to transcribe data from source material onto punchcards, paper or magnetic tape, or magnetic cards, and to record accounting or statistical data for subsequent processing by automatic or electronic data processing equipment:

General learning ability is required to follow instructions to insure that correct format is followed in preparing program cards and reading the data.

G-4:6 Assists workers engaged in preparing foods for hotels, restaurants, or institutions, by washing, peeling, cutting or grinding meats, vegetables, or fruits, preparing salads, mixing ingredients for desserts, portioning foods on plates or serving trays, loading serving trays on delivery carts, carrying pans and kettles to and from work station, and cleaning work area, equipment and utensils:

General learning ability is required to learn routine of kitchen, location of materials, equipment, and utensils, and various tasks to be performed. Must understand instructions pertaining to mixing of ingredients for salads, gelatin and pudding-mix desserts; and for portioning food.

Level 5

G-5:1 Strings jewelry articles on wire or hangs articles on racks preparatory to further processing, such as soldering, cleaning, plating, or stripping, and carries to machine operator:

General learning ability is required to determine the order of operation in stringing or hanging jewelry articles.

G-5:2 Picks bones from offal as it passes on conveyor belt and tosses bones onto conveyor:

General learning ability is required to learn a two-part operation.

V-VERBAL APTITUDE: The ability to understand meaning of words and to use them effectively. Ability to comprehend language, to understand relationships between words, and to understand meanings of whole sentences and paragraphs.

Interpretive Information for Analysts: Consider reading comprehension required to: use or understand oral or written instructions or specifications, texts used in training, and reference materials used in work or mastery of required technical terminology.

Level 1

V-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems in various fields by mathematical methods:

Verbal aptitude is required to understand meanings and relationships of mathematical symbols, formulas, and concepts; to develop methods and procedures of problem solving through reasoning; to understand terminology from such fields as engineering, data processing, or management in order to discuss problems with others whose background is in such fields and explain to them how mathematical concepts can be adapted to the solution of their problems; and to present solutions in logical and systematic forms and sequences.

V-1:2 Attends to variety of medical cases in general practice, diagnosing, prescribing medicine for, and otherwise treating diseases and disorders of the human body, and performing surgery:

Verbal aptitude is required for reading comprehension of complex technical materials in such areas as anatomy, biochemistry, physiology, pharmacology, pathology, bacteriology, and radiology; and for facility of expression to explain illness, treatment, or preventive measures to patients, or to discuss diagnosis and symptoms with colleagues.

V-1:3 Designs chemical plant equipment and devises processes for manufacturing chemicals and products, such as gasoline, synthetic rubber, plastics, detergent, cement, and paper and pulp, applying principles and technology of chemistry, physics, mechanical and electrical engineering, and related areas:

Verbal aptitude is required to acquire the technical vocabulary of chemistry and engineering; to read and understand reference materials; and to write technical reports and design or production specifications.

V-1:4 Directs editorial activities of newspaper and negotiates with production, advertising, and circulation department heads as owner's representative:

Verbal aptitude is necessary to write lead or policy editorials explaining complex political, social, or other issues in language which will be understood by most readers; to interpret the editorial policy of the firm on specific issues to other editorial writers; and to speak at professional and community functions as a representative of the publisher.

V-1:5 Conducts criminal and civil lawsuits, draws up legal documents, advises clients as to legal rights, and practices other phases of law; and represents client in court, and before quasi-judicial or administrative agencies of government:

Verbal aptitude is required to comprehend and interpret legal terminology for use in preparing legal documents, and in presenting oral or written arguments.

V-1:6 Selects, catalogs, and maintains library collection of books, periodicals, documents, films, recordings, and other materials, and assists groups and individuals to locate and obtain materials:

Verbal aptitude is required to review materials preparatory to purchase to see that they do not duplicate others and are consistent with the subject matter collection policy of the library; to accurately determine subject matter of books in order to properly code them and prepare cross references; and to prepare and give talks to groups of patrons.

V-1:7 Collects, analyzes, and develops occupational data concerning jobs, job qualifications, and worker characteristics to facilitate personnel, administrative, or information functions in private or public organizations:

Verbal aptitude is required to read, understand, and interpret various kinds of technical data; to write reports, letters, and job descriptions concisely and clearly; and to conduct information gathering interviews.

V-1:8 Draws cartoons for publication to illustrate highlights of news topics in satirical or humorous manner:

Verbal aptitude is required to read news items to obtain subject for cartoons; discuss policy and method of presentation with editor; translate ideas from verbal to pictorial form; and to select most significant wording for caption to bring out meaning of cartoon.

Level 2

V-2:1 Converts symbolic statement of business problem to detailed logical flow charts for coding into computer language and solution by means of automatic data processing equipment:

Verbal aptitude is required to read and understand statements of operations and procedural routines from various departments; to discuss program objectives and output requirements with supervisor and department heads; to explain programing techniques and principles while attending briefings, meetings, and interviews; and to write a documentation of each program's development.

V-2:2 Instructs students in one or more subjects, such as English, mathematics, or social studies, in private, religious, or public secondary school (high school):

Verbal aptitude is required to read and understand textbooks or other literature related to the subject matter taught; to lecture on, discuss, and explain subject matter to convey information to the students; to write lesson plans and outlines; and to read students' papers and write critiques.

V-2:3 Edits motion picture film and sound track:

Verbal aptitude is required to listen critically to the dialogue to determine if it is understandable and maintains the story continuity.

V-2:4 Interviews job applicants in employment agency and refers them to prospective employers for consideration:

Verbal aptitude is required to speak and understand the applicants' language in order to learn their background, qualifications, and goals; and to explain the employment service to employers and obtain requirements data for job orders.

V-2:5 Reads books or scripts of radio and television programs to detect and recommend deletion of vulgar, immoral, libelous, or misleading statements:

Verbal aptitude is required to understand the expressed and implied meanings and possible connotations of words in script and statements in the context used.

V-2:6 Schedules and assigns motor vehicles and drivers for the conveyance of freight according to company and government regulations and policies:

Verbal aptitude is required to read and understand the rules, laws, regulations, and/or policies of the company, union, and Interstate Commerce Commission; to effectively communicate instructions to drivers; and to write reports.

V-2:7 Sells automotive parts and equipment and advises customers on substitution or modification of parts when replacement is not available:

Verbal aptitude is required to ask pertinent questions to determine merchandise desired by customer; to answer technical questions and explain use of parts; and to provide other information requested.

V-2:8 Takes dictation, in shorthand, of correspondence, reports, and other matters, and transcribes material, using typewriter:

Verbal aptitude is required to comprehend meaning of words to record and transcribe dictation accurately.

Level 3

V-3:1 Operates switchboard to provide answering service for clients:

Verbal aptitude is required to greet caller and announce name and phone number of client; to record and deliver messages; to furnish information; to accept orders; and to relay calls.

V-3:2 Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy:

Verbal aptitude is required to understand the meaning of words, sentences, and whole paragraphs well enough so that, in copying from a rough draft, insertions which are out of context or incorrectly placed can be noted.

V-3:3 Supervises and coordinates activities of workers engaged in assembly of electronic equipment such as radar and sonar units, missile control systems, computers, cables and harnesses, and test equipment:

258

Explains wiring and soldering procedures to new employees. Reads test reports to determine cause of equipment failures and explains procedures to workers to correct practices that result in defects. Explains company policies and discusses grievances with workers or their representative.

V-3:4 Questions patients to obtain their medical history, personal data, and to determine if they are allergic to dental drugs or have any complicating illnesses:

Converses with patient in reassuring manner; explains post-operative care, oral hygiene, and importance of preventive dentistry to patients. Greets patients, answers telephone, and schedules appointments.

V-3:5 Sells variety of commodities in sales establishment:

Describes salient features to customer, and advises customer in making selection by explaining use of particular article or suggesting other articles.

V-3:6 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of machines, shop mathematics, metal properties, and layout machining procedures:

Verbal aptitude is required to read text materials while attending classes during training or apprenticeship; and to understand language in shop orders, specifications, and other written or oral instructions.

V-3:7 Provides beauty service for customers; suggests coiffure according to physical features of patron and current styles, or determines coiffure from instructions of patron; suggests cosmetics for conditions, such as dry or oily skin:

Verbal aptitude is required to greet patrons, ascertain services desired, and explain beauty treatments, hair styles, and other services.

V-3:8 Repairs and overhauls automobiles, buses, trucks, and other automotive vehicles:

Reads and interprets technical manuals, charts, and parts manuals to plan work procedures and select replacement parts; discusses nature and extent of damage and repairs needed with customer and service manager.

V-3:9 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools, and conforming to local building codes:

Verbal aptitude is required to read blueprints for information pertaining to materials and dimensions; and to understand building codes and company safety practice rules.

Level 4

V-4:1 Records brand marks used to identify cattle, produce, or other commodities to facilitate identification:

Reads applications for new brands and official brand record; records assignment or reassignment of brands; reads to file reports to field inspectors.

V-4:2 Mixes and bakes ingredients according to recipes and production order to produce breads, pastries, and other baked goods:

Must read recipes and production orders to determine number and kind of bakery products to make, ingredients to use, and mixing and baking instructions.

V-4:3 Welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using equipment which introduces a shield of inert or noncombustible gas around the electric arc to prevent oxidation:

Verbal aptitude is required to read work order or receive oral instructions indicating type of material and number of units to be welded, type and size of electrode material to use, type of gas shield to use, settings for gas pressure, electric current amperage, and speed of electrode wire feed.

V-4:4 Tends any of a variety of machine tools, such as lathes, drill presses, milling machines, grinders, and special purpose machines, to machine metal workpieces to specifications on a production basis:

Reads written instructions or work orders to determine number and kind of parts to be machined and kind of metal stock or castings to use. Requests stock and cutting tools from stock room, specifying sizes, types, and amounts.

V-4:5 Cares for children in private home:

Must read directions for preparation of formulas, and possess sufficient vocabulary to understand instructions regarding care of children.

V-4:6 Services automobiles, buses, trucks, and other automotive vehicles with fuel, lubricants, and accessories as requested by customer:

Verbal aptitude is required to understand specific instructions from station manager and to communicate with customers.

V-4:7 Assembles metal toys on assembly line, changing tasks as directed according to workload of department; tends drill press or punch press; fits parts together; and joins parts using resistance welder, fold-over tabs, or nuts and bolts:

Verbal aptitude is required to understand oral instructions specifying parts to assemble, position of parts, sequence of assembly, and methods of fastening parts for several types and models of toys and stages of assembly.

Level 5

V-5:1 Wears signboards and walks in public to advertise merchandise, services, or belief:

Verbal aptitude is required to understand simple instructions regarding direction and duration.

V-5:2 Delivers telephone directories to residences and business establishments, on foot:

Verbal aptitude is required to understand simple oral instructions and to read numbers and street names.

N- **NUMERICAL APTITUDE:** The ability to perform arithmetic operations quickly and accurately.

Interpretive Information for Analysts: Consider, or compare with work examples, such as making change from currency of one denomination to another; keeping of time or production records; using math or geometry to lay out geometric patterns; making accurate numerical measurements; and making or checking numerical entries. Consider the complexity of numerical operations as well as speed required and volume of arithmetic activity.

Note: When job requirements go beyond arithmetic (the four functions) and include the sciences of geometry, algebra, calculus, and other forms of "higher" mathematics, an "important" rating for N will automatically be assigned.

Level 1

N-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems in various fields by mathematical methods:

Numerical aptitude is required to understand mathematical symbols, formulas, and concepts; to develop methods and procedures of problem solving; and to test hypotheses and alternate theories.

N-1:2 Performs variety of engineering work in designing, planning, or overseeing the manufacture, construction, installation, or maintenance of electric or electronic systems, equipment, or machinery used in the generation, transmission, or utilization of electrical energy for domestic, commercial, or industrial consumption:

Numerical aptitude is required for the understanding and application of algebra, trigonometry, analytical geometry, calculus, and differential equations to engineering problems.

N-1:3 Converts engineering, scientific, and other technical problem formulations into format processable by computer:

Numerical aptitude is required to identify mathematical formulas, equations, and assumptions presented in support of problem; to analyze problem using mathematical formulas, tables, and reference materials; and to make computations involving the use of linear algebra, vector analysis, differential equations, and calculus to identify each mathematical element in the solution of the problem.

N-1:4 Collects, analyzes, and interprets data on problems of public finance:

Computes or formulates problems for solution by others to determine government income and expenditures by source and function, using such data as tax tables and rates, income and population projections, and proposed budget and expenditure projections. Determines impact of tax and fiscal policies on level of income and business activities. Computes initial and final distribution of tax burden and its effects from analysis of shifting and incidence patterns for various types of taxes. Computes probable revenues and effects of new taxes or tax rates. Computations and formulation of problems require the use of statistical methods, algebra, and some calculus.

N-1:5 Researches market conditions in local, regional, or national area to determine potential sales of a product or service:

Computes and analyzes statistical data on past sales of firm and general wholesale and retail sales trends to forecast future sales trends. Makes statistical projections based on population, income, sales data, and consumer surveys.

N-1:6 Reviews applications for casualty insurance to evaluate degree of risk involved, following company's underwriting policies:

Determines amount of risk company will insure, based on value of property and risks involved, and the premium thereon. Determines the value of each factor affecting the degree of risk and applies the applicable premium to each using rate tables or computes the weighted value of each factor to arrive at a final composite weight used to compute the premium; computes amount of insurance in force in the particular class of risk or in the same area to assure that the company is spreading its risks sufficiently, according to probability tables.

N-1:7 Prepares cost and work completion estimates for engineering contract bids:

Numerical aptitude is required to compute and list total quantity of each type of material needed from blueprints and specifications; to compute quantity of standard sizes or lots needed for each segment of structure or part; to estimate cost of raw materials, purchased equipment, or subcontracted work, and labor, using price lists, standard or estimated time/cost figures, and materials lists; and to set delivery or completion dates.

Level 2

N-2:1 Applies principles of accounting to install and maintain operation of general accounting system:

Applies numerical reasoning to design or modify systems to provide records of assets, liabilities, and financial transactions; applying arithmetic principles to prepare accounts, records, and reports based on them; auditing contracts, orders, and vouchers; and preparing tax returns and other reports to government agencies.

N-2:2 Draws and corrects topographical maps from source data, such as surveying notes, aerial photographs, or other maps:

Numerical aptitude is required to make arithmetic computations to lay out scale representations of mountains, cities, and other geographic features so that correct proportions and distances are achieved.

N-2:3 Applies electronic theory, principles of electrical circuits, electrical testing procedures, mathematics, physics, and related subjects to lay out, build, test, troubleshoot, repair, and modify developmental and production electronic equipment, such as computers, missile-control instrumentation, and machine tool numerical controls:

Numerical aptitude is required to calculate value and sizes of circuitry components needed, when not specified; to compute output values or potential of units; and to prepare graphs showing operating characteristics of system, using mathematical tables and formulas.

N-2:4 Develops resistance welding and brazing machine set up data for work orders to insure that parts conform to blueprints and engineering specifications, applying knowledge of machine function, electronics, properties of metals, effects of heat, and shop mathematics:

Computes combination of pressure, current, holding time, and impact required to obtain specified weld, interpolating from tables and charts, and multiplying and dividing fractions and decimals to arrive at machine settings. Measures and makes arithmetic computations to determine dimensional setup for workpiece and electrodes and size of jigs or fixtures needed.

N-2:5 Schedules and assigns motor vehicles and drivers for conveyance of freight, according to availability, length of trip, freight requirements, vehicle capacities and licenses, and user preferences:

Numerical aptitude is required to compute truck capacities for various products; to estimate delivery time; to compute delivery charges; and to prepare statistical reports and studies on operations, equipment, and personnel.

N-2:6 Repairs electronic equipment, such as computers, industrial controls, radar systems, telemetering and missile control systems, following blueprints and manufacturers' specifications using handtools and test instruments:

Numerical aptitude is required to calculate dimensions; to determine output measurements of components; to compute ratios when calibrating instruments; and to apply principles of geometry and trigonometry to compute angles and coordinates.

N-2:7 Directs operation of retail, self-service food store according to overall organizational policies:

Numerical aptitude is necessary to determine amounts of merchandise needed based on stock and past sales; to prepare requisitions or orders; to adjust prices based on amount, condition and saleability of item; and to prepare financial reports, such as sales reports, time and payroll reports, bank deposits, or inventories.

Level 3

N-3:1 Supervises and coordinates activities of workers engaged in extracting alumina from bauxite:

Numerical aptitude is required to calculate feed rates of raw materials, using standard formulas and chemical analysis reports to compute rate of inputs; to study production schedules and estimate man hour requirements for completion of job assignment; and to adjust work schedules or staffing to meet production requirements, using knowledge of capacities of machines and equipment; and to maintain time and production records.

N-3:2 Sells tickets for transportation agencies, such as airlines, bus companies, railroads, and steamship lines:

Numerical aptitude is required to compute ticket cost and taxes, using schedules and rate books; to check and weigh baggage; to compute travel time and fares for different types of accommodations; to prepare daily sales record showing number and class of tickets sold and amount of fare and taxes; and to count and balance cash with sales record.

N-3:3 Grows shrubs, rootstocks, cut flowers, or flowering bulbs:

Computes acreage to be planted according to estimated demand for species, availability and cost of seed, bulbs, or scion stock and space requirements for each variety. Maintains record of wages and hours of workers.

N-3:4 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools:

Measures and computes unspecified dimensions to prepare layouts, mark cutting and assembly lines on materials, shape materials to prescribed measurements, and fit and install window and door frames, trim cabinet work, and hardware.

N-3:5 Acts as intermediary between importers, steamship companies, or airlines and Bureau of Customs by preparing and compiling documents required by Federal Government for a ship or airplane of foreign origin to discharge its cargo at a domestic port:

Computes and quotes duty rates and amounts on commodities using excise and tariff rate tables applicable to commodity.

N-3:6 Designs and prepares decorated foods and artistic food arrangements for buffets in formal restaurants:

Reviews advance menus to determine amount and type of food to be served; prepares food according to recipe; computes amount of food needed, based on number of persons to be served and standard amounts per person: and adjusts standard recipes to obtain required quantities. Measures and weighs ingredients.

N-3:7 Receives cash from customers or from other employees in payment for goods or services in retail or service establishment, and records amount received:

Computes bill and itemizes list or ticket showing amount due, using adding machine or cash register; makes change, cashes checks, and issues receipts; records amount received and prepares reports of transactions; and reads and records totals on cash register verifying against cash on hand.

Level 4

N-4:1 Makes women's garments, such as dresses, coats, and suits according to customer specifications and measurements:

Measures customer to determine dimensions of garment; and adds and subtracts to adjust pattern to customer's dimensions.

N-4:2 Inspects loaded freight cars:

Measures height and width of loads to ensure that they will pass over bridges and through tunnels on scheduled route.

N-4:3 Coordinates and expedites flow of material, parts, and assemblies within or between departments in accordance with production and shipping schedules or department supervisors' priorities:

Numerical aptitude is required to determine quantities of material, adding and subtracting to determine items of total order which are in various stages of manufacturing sequence.

N-4:4 Sets up knitting machines to knit hose, garments, and cloth according to specifications, and adjusts and repairs machines, using knowledge of machine function:

Must measure, add, and subtract to determine number and size of cams and links for set up, to synchronize machine, and to make repairs.

N-4:5 Mixes and bakes ingredients according to recipes to produce bread, pastries, and other baked goods:

Numerical aptitude is required to calculate quantities and proportions of ingredients based on master recipes and for the measurement of temperatures, time, and weights.

N-4:6 Records business transactions in journals, ledgers, and on special forms and transfers entries from one accounting record to another:

Adds totals of entries after posting and compares totals with original records to detect errors.

Level 5

N-5:1 Strings jewelry articles on wire or hangs articles on racks preparatory to further processing, such as soldering, cleaning, plating, or stripping, and carries to machine operator:

Numerical aptitude is required to keep tally of jewelry articles strung or hung.

N-5:2 Delivers telephone directories to residences or business establishments on foot:

Numerical aptitude is required to understand relation of consecutive numbers in addresses or office numbers.

S- **SPATIAL APTITUDE:** The ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

Interpretive Information for Analysts: Frequently described as the ability to "visualize" objects of two or three dimensions, or to think visually of geometric forms. Work examples are such activities as laying out, positioning, and alining objects; observing movements of objects, such as vehicles in traffic or machines in operation, and comprehending how the movements affect their spatial position concurrently; achieving balanced design; and understanding and anticipating the effects of physical stresses in structural situations.

Level 1

S-1:1 Diagnoses and treats disease, injuries, and malformations of teeth, gums, and related oral structures:

Spatial aptitude is required to read X-rays; to comprehend relation between teeth, tooth functions, tooth forms, stresses, and all phases of occlusion.

S-1:2 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields, and solves or directs solutions to problems by mathematical methods:

Spatial aptitude is required to visualize and understand the special relationships of objects and forces involved in a situation and their resultant effects on each other.

S-1:3 Plans and designs private residences, office buildings, theatres, public buildings, factories, and other structures; and organizes services necessary for their construction:

Plans layout of project, using visual imagination to integrate structural, mechanical, and ornamental elements into a unified design. Prepares sketches and elevation view of project for client. Prepares scale and full-size drawings for use by building contractors and craft workers.

S-1:4 Performs variety of engineering work in designing, planning, and overseeing manufacture, construction, installation, and operation of electric or electronic equipment, and systems, used in generation and utilization of electrical energy for industrial and domestic consumption:

Spatial ability is required in the design and construction of electrical systems and equipment to visualize the spatial relationships of static and dynamic components and the spatial characteristics of energy flows.

S-1:5 Draws and paints illustrations for advertisements, books, magazines, posters, billboards, and catalogs:

Renders details from memory, live models, manufactured products, or reference materials to execute design.

Level 2

S-2:1 Prepares working plans and detail drawings from rough or detailed sketches or notes, for engineering or manufacturing purposes according to specified dimensions:

Spatial aptitude is required in interpreting blueprints, sketches, and specifications, and in preparing detailed, scale drawings of three-dimensional parts or mechanisms from sketches, layout, and oral instructions.

S-2:2 Performs dances alone, with partner, or in groups to entertain audience:

Spatial aptitude is required to interpret diagrams and instructions for proposed choreography; to visualize relative position of self with others; and to imagine how dance routines will appear to public.

S-2:3 Repairs and adjusts radios and television receivers, using handtools and electronic testing instruments:

Spatial aptitude is required to read circuit diagrams in order to assemble and repair radio and television set components; to visualize power flow and spatial relationship of components and circuits as they relate to various functions, to isolate them for testing, and to test each circuit serially; and to visualize the source of trouble from observation of picture or from sound.

S-2:4 Creates designs and prepares patterns for new types and styles of men's, women's, and children's wearing apparel or knitted garments:

Spatial aptitude is required to visualize the garment to be created and to sketch designs of it; to construct original patterns; and to use patterns to make garments.

S-2:5 Controls air traffic on and within vicinity of airport, according to established procedures and policies, to prevent collisions, and to minimize delays arising from traffic congestion:

Spatial aptitude is required to observe the spatial relationships of aircraft within the immediate vicinity of the airport; and to visualize the relative positions of other aircraft from radar, time, distance, speed, and altitude information.

S-2:6 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of mechanics, shop mathematics, metal properties, and layout machining procedures:

Spatial aptitude is required to interpret blueprints and sketches, make layouts, set up workpiece in chuck or on face plate, and to inspect completed work for compliance with shop orders and drawings.

S-2:7 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's handtools and power tools, and conforming to local building codes:

Spatial aptitude is required to interpret blueprints and visualize the three dimensional form of the structure from prints; to lay out workpieces from blueprints; to shape and fit parts; and to construct forms for pouring concrete.

S-2:8 Assists driller in operating machinery to drill oil or gas wells, using handtools or power tongs and wrenches:

Spatial aptitude is required to visualize spatial relationships rapidly while placing tools and guiding lower end of drill-pipe sections to rack and unrack them; and to constantly be aware of the location of other workers, tools, and materials as they move about work area in order to prevent accidents.

Level 3

S-3:1 Operates bridge or gantry crane, consisting of hoist and operator's cab mounted on bridge which runs along track to lift, move, and load machinery, equipment, and variety of loose materials:

Spatial aptitude is required to observe the relationship between the moving load and fixed items, such as machines, trucks, posts, etc., in order to avoid bumping load, and to position load in trucks or on stacks, or dump it into machines or equipment.

S-3:2 Installs, adjusts, and maintains electrical wiring, switches, and fixtures in airplanes according to blueprints and wiring diagrams:

Spatial aptitude is required to determine sizes and types of control boxes, relays, instruments, and accessories to install, and the location from blueprints and wiring diagrams.

S-3:3 Forms sand molds for the production of metal castings, using handtools, power tools, patterns, and flasks, and applying knowledge of variables, such as metal characteristics, molding sand, contours of patterns, and pouring procedures:

Spatial aptitude is required to visualize mold shape from part print or pattern; to visualize flow of metal during pouring process and gas formation to determine location and size of runner and sprue holes; to visualize points of stress on mold during pouring; and to determine location for reinforcing material.

S-3:4 Constructs and repairs dental appliances, according to prescription:

Spatial aptitude is required to visualize and sketch outline of prosthetic dental appliance on stone model of upper and lower jaws, using impressions as guides; and to check movement and fit of upper and lower jaw models to determine proper alinement, and to approximate position and function of appliance being made.

S-3:5 Supervises and coordinates activities of workers engaged in loading and unloading of ships' cargoes:

Visualizes available cargo space, spatial dimensions of individual shipments and how they can be rearranged, and order of removal at various ports to determine the sequence and arrangement of the load.

S-3:6 Makes women's garments, such as dresses, coats, and suits, according to customer's specifications and measurements:

Spatial aptitude is required to use patterns visualizing the relationship between pattern pieces and finished garment and following pattern instructions; and to alter basic patterns proportionally to adapt them to customer's measurements.

S-3:7 Sets up and operates machines that measure, print, cut, fold, glue, or seal plain or waxed papers, polyethylene film, or cellophane to form bags:

Spatial aptitude is required to adjust cutters, feeders, printing roller, and other mechanisms, according to specifications for type and size of bag being produced.

Level 4

S-4:1 Inspects electronic units and subassemblies, such as radio transmitters, computer circuits, and cables, for conformance to specifications:

Spatial aptitude is required to examine completed assemblies relating them to configuration sheet to determine that components are in specified positions.

S-4:2 Tends film cutter and mounting press to mount color-film transparencies:

Alines cutting blade of film-cutting machine with frame separating line between transparencies on film strips.

S-4:3 Smooths and finishes surfaces of poured concrete floors, walls, sidewalks, or curbs to specified textures, using handtools, including floats, trowels, and screeds:

Determines grade and contours from construction drawings and selects screeds needed to form or guide forming of work to specified shape.

S-4:4 Drives gasoline- or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, or trailer hitch, to push, pull, lift, stack, or tier merchandise, equipment, or bulk materials in warehouse, storage yard, or factory:

Observes changing position of fork in relation to objects or materials to maneuver fork under load; observes position of load relative to other objects to move load about and to position or stack load.

S-4:5 Tends units of fresh-work cigar machine that cuts wrapper leaf and wraps leaf around bunch:

Spreads wrapper leaf over die of machine in such a manner as to obtain maximum cuts per leaf.

S-4:6 Joins and reinforces parts of articles, such as garments, curtains, parachutes, stuffed toys, hats, and caps; sews buttonholes and attaches fasteners, such as buttons, snaps, and hooks, to articles; or sews decorative trimmings to articles using needle and thread:

Alines parts, fasteners or trimming, working with two dimensions in a single plane, to obtain desired appearance when item is in use.

Level 5

S-5:1 Cuts seed potatoes into sections of uniform size for mechanical planting:

Spatial aptitude is required to visualize sections of uniform size for cutting seed potatoes.

S-5:2 Strings jewelry articles on wire or hangs articles on racks preparatory to further processing, such as soldering, cleaning, plating, or stripping, and carries to machine operator:

Spatial aptitude is required to place and arrange jewelry articles on wire rack.

P - FORM PERCEPTION: The ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Interpretive Information for Analysts: Consider such activities as inspecting surfaces for consistency in coloring, scratches, flaws, grain, texture, and the like; observing lint, dust, etc., on surfaces; determining if patterns are correct or match; and recognizing small parts.

Note: Spatial deals with visualization of the shape of objects as well as comprehension of forms in space. Form perception, on the other hand, pertains to the perception of surface details.

Level 1

P-1:1 Conducts studies of all nonmetallic minerals used in horological industry:

Is able to perceive detail of grain size, pattern, and crystalline orientation in diamonds and abrasives and see differences in the features and size of grain angles using optical, X-ray, and other precision instruments.

P-1:2 Performs chemical, microscopic, and bacteriologic tests to provide data for use in treatment and diagnosis of disease:

Form perception is required to perceive pertinent details of shape, shade, and other characteristics when examining or comparing specimens or cultures under microscope.

Level 2

P-2:1 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:

Is able to perceive details of tooth and tissue structure and condition, tooth form, shadings of teeth (when preparing dentures), shape and shading of teeth when examining X-rays, and parallelism and fit of dentures and inlays.

P-2:2 Draws and corrects topographical maps from source data, such as surveying notes, aerial photographs, or other maps:

Is able to perceive details of land contours or other physical features in stereoscopic aerial photographs and other topographical maps; draw different widths and types of lines, each with specific meanings in topography; and assure that scale is maintained throughout drawing.

P-2:3 Develops specificiations for and blows and shapes glass laboratory apparatus, such as test tubes, retorts, and flasks, and glass components for such apparatus as condensers, vacuum pumps, barometers, and thermometers:

Form perception is required to see details in customer's sketches and work plans; to observe when specified shape and angles are obtained in glass; to inspect glass visually for flaws and pin holes; and to read measuring instruments such as micrometers and calipers.

P-2:4 Changes undesirable details of illustrations which are to be reproduced by lithographic process:

Observes differences in shading (contrast) when comparing positives and negatives with original copy of illustration layout, and when applying dyes and etching solution. Must perceive details of object or fixture to apply opaque solution and halftone dots by hand; to pencil in highlights and retouch flaws; and to scrape areas to reduce density.

P-2:5 Analyzes variety of specifications, lays out metal stock, sets up and operates machine tools, and fits and assembles parts to make and repair metalworking dies, cutting tools, jigs, fixtures, gages, and machinists' handtools, applying knowledge of tool and die design and construction, shop mathematics, metal properties, and layout, machining, and assembly procedures:

Form perception is required to read dial indicators and machine settings; to observe cut as it is made by tool to be sure surface of part is not scored; to inspect workpiece visually and with precision gages to detect surface and dimensional defects; and to check fit of dies and parts.

P-2:6 Repairs radio receivers, phonographs, recorders, and other electronic-audio equipment, using circuit diagrams and test meters:

Form perception is required to inspect visually all circuits and connections for breaks or looseness; to detect defects in components by visual examinations; and to recognize components by their size, shape, and position.

P-2:7 Reads typescript or galley proof to detect and mark for correction any grammatical, typographical, or compositional errors:

Is able to perceive pertinent detail in proof, such as blurs, misshapen letters, margin alinement, and spacing.

Level 3

P-3:1 Grades cured tobacco leaves preparatory to marketing or processing into tobacco products:

Visually inspects and feels leaves to determine their grade according to size and texture, and to detect damage to leaf.

P-3:2 Forms sand molds for production of metal castings, using handtools, power tools, patterns, and flasks, applying knowledge of variables, such as metal characteristics, molding sand, contours of patterns, and pouring procedures:

Form perception is required to determine appropriate length, width, and position of runners and sprue holes to be cut in mold; and to detect and repair damage to interior surfaces of mold.

P-3:3 Repairs and services office machines, such as adding, accounting, and calculating machines, and typewriters, using handtools, power tools, micrometers, and welding equipment:

Form perception is required to identify machine parts, and to detect defects in parts by their shape and alinement with other parts, when determining type and extent of repairs or service needed.

P-3:4 Inspects and assembles machined bomb-fuse parts, using handtools and power tools:

Examines machined parts, prior to assembly, for burrs and excess metal, using magnifying glass for small parts; and files and grinds off burrs and excess metal.

P-3:5 Cuts and trims meat to size for display or as ordered by customer, using handtools and power equipment, such as grinder, curbing machine, and power saw:

Form perception is required to aline carcass with blade of saw in order to break down large sections into smaller standard cuts; to examine shape, marbling, fat, and bone to determine most economical means of preparing cuts; to trim fat and bone; and to examine shape and grain to determine cutting line to follow to make standard cuts, such as loin roasts, steaks, etc.

P-3:6 Prepares wire-wound coils for assembly in electronic or electrical equipment:

Inspects materials and coils for defects; locates tap wires in wound coils and pulls them out with tweezers and picks; bends wires to specified shape; and solders minute wires together or to terminal lugs.

P-3:7 Inspects glass bottles and glass containers from bottlemaking machine, rejects defective ware, and packs selected ware into cartons:

Form perception is required to inspect bottles and detect flaws in glass, such as cracks, checks, and splits, and irregularities of shape and size.

P-3:8 Operates battery of looms to weave yarn into cloth:

Form perception is required to make visual inspections of looms prior to and during operation to be sure shuttles are in position and no yarn strands are broken; and to detect mispicks, imperfections in weave, and breaks in warp fibers.

Level 4

P-4:1 Operates cylinder press to score and cut paperboard sheets into box or container blanks:

Observes alinement of paperboard to adjust feeding and stacking mechanism. Inspects cutting and scoring lines to detect defects.

P-4:2 Performs one or more repetitive bench or line assembly operations, to mass produce products, such as automobile or tractor radiators, blower wheels, refrigerators, or gas stoves:

Form perception is required when buffing parts to see when burrs are buffed from ends of tubing and proper taper is attained; and to see small bubbles rise to surface of test tank denoting leak in coil, and to locate their source.

P-4:3 Receives, stores, and issues equipment, materials, supplies, merchandise, foodstuffs, or tools, and compiles stock records in stockroom, warehouse, or storage yard:

Examines stock to identify item according to size, shape or other characteristics in order to verify conformance to requisitions or invoice specifications.

P-4:4 Packs agricultural produce, such as bulbs, fruit, nuts, eggs, and vegetables, for storage or shipment:

Form perception is required to recognize differences in size, shape, and condition of produce; to pack produce in prescribed pattern according to sizes and shapes; to inspect produce visually for imperfections; and to identify and remove foreign matter.

P-4:5 Installs control cables to door, window, engine, and flight-control surfaces of airplanes, according to specifications, using wrenches, screwdrivers, pliers, and drills:

Form perception is required to measure and locate positions for pulleys, guides, and brackets; to thread cable from control levers, through pulleys and guides to mechanism according to specified pattern; and to observe during functional checks to determine necessary adjustments.

P-4:6 Operates pressing machine to smooth surfaces, flatten seams, or shape articles, such as garments, drapes, slipcovers, and hose in manufacturing or drycleaning establishments:

Form perception is required to position articles on press buck (padded table of machine) to insure a smooth press; to shape articles when positioning; and to inspect garments for wrinkles and shape after pressing.

P-4:7 Welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using equipment which introduces shield of inert gas between electrode and workpiece to prevent oxidation:

Form perception is required to see details in work diagrams, to aline workpiece according to layout markings; to follow line to be welded; to guide torch; and to inspect weld bead for consistent size, straightness, and complete fill of joint.

Level 5

P-5:1 Cuts seed potatoes into sections of uniform size for mechanical planting:

Form perception is required to recognize differences in shapes and sizes in order to ensure maximum number of cuts per potato.

P-5:2 Places tobacco tin over form and beats with hammer or mallet, or uses straightening device to remove dents from tin:

Form perception is required to recognize presence of dents and to know when dents have been completely removed.

Q - CLERICAL PERCEPTION: The ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. A measure of speed of perception which is required in many industrial jobs even when the job does not have verbal or numerical content.

Interpretive Information for Analysts: In trade and craft jobs consider the work orders, specifications, dials, gages, and measuring devices which must be read. Consider whether perceptual errors in reading words and numbers or in rapidly comparing similar forms or shapes would result in defective work.

Level 1

Q-1:1 Conducts research in fundamental mathematics and in application of mathematical techniques to science, management, and other fields; and solves or directs solutions to problems in various fields by mathematical methods:

Accurately perceives numbers when performing computations, applying methods of numerical analysis, and operating calculators, plotters, or other electrical computation machines in solving problems in support of mathematical, scientific, or industrial research activity, and in analyzing tabular material produced as part of such research.

Q-1:2 Reads and corrects proof while original copy is read aloud:

Clerical perception is required to see details in proof pages such as the way words are spelled, capitalized, hyphenated, and abbreviated; and to detect typographical errors, such as misspelling, wrong punctuation, skips, or repeats.

Q-1:3 Converts symbolic statement of business problems to detailed logical flow charts for coding into computer language and solution by means of automatic data processing equipment:

Clerical perception is required to perceive pertinent detail in program documentation, assembled data, and recommended program routines; to prepare input, output, and nomenclature lists; to translate step-by-step instructions from flow charts for console operator; to recognize and detect errors in program instructions; to correct errors by altering sequence of steps; and to avoid computation errors.

Level 2

Q-2:1 Performs variety of clerical duties, such as filing correspondence, records, and reports; typing letters and reports; preparing bills; computing payrolls; compiling reports; addressing, sorting, and distributing mail; taking dictation; tabulating and posting data in record books; keeping inventory records; and giving information:

Clerical perception is required to read, record, and type numbers and names quickly and accurately, to file letters, prepare records and reports, and to post data.

Q-2:2 Reviews individual applications for insurance, evaluates the degree of risk involved, and accepts applications, following company's underwriting policies:

Clerical perception is required to compute accurately the value of property and risk involved; to figure premiums using tables and weighted values for risk factors; to note pertinent details in insurance applications and investigation reports; and to read accurately tables and insurance maps, indicating amount and type of insurance used in specific areas.

Q-2:3 Operates machine to perforate paper tape used to control casting type:

Clerical perception is required to read copy and strike keys accurately on keyboard to punch tape; to read tables to determine number of justification keys to punch to justify lines of type; and to read tables to avoid perceptual errors in arithmetic when converting line measures from one unit of measure to another.

Q-2:4 Answers inquiries regarding schedules; describes routes, services, and accommodations available; reserves space; and sells tickets for transportation agencies, such as airlines, bus companies, railroads, and steamship lines:

Clerical perception is required to read accurately schedules and manuals with route and accommodation information; to make out tickets and passenger lists and to record reservation information; to avoid perceptual errors when reading rate schedules, and computing fares and baggage charges; and to keep records of tickets sold, type of accommodations, fares, taxes, and payment.

Q-2:5 Performs chemical, microscopic, and bacteriologic tests to provide data for use in treatment and diagnosis of disease:

Clerical perception is required to read laboratory test request slips, to determine patient for whom tests are to be made, type of test, quantities and types of specimens to be taken, and special test instructions; to read words and chemical symbols on laboratory supplies for selection of exact chemical to use in tests; to read reference materials determining type and quantities of reagents to use in analysis; to perceive numbers accurately when performing arithmetic computations for quantitative analyses; and to perceive words and numbers accurately when filing test reports, specimens, and other records, according to alphabetical and numerical systems.

Q-2:6 Determines conformance of cloth to weight standards by computing weight per yard of cloth and comparing computations with information on style card:

Clerical perception is required to read identification tag on bolt of cloth, to determine style number, weight, and length; to perceive accurately numbers and markings on slide rule in order to compute weight per yard; to compare computation with standard listed on style card; and to record accurately weight, yardage, weight per yard, and style number for each bolt on production sheet.

Q-2:7 Renders general nursing care to patients in hospital, infirmary, sanitarium, or similar institution:

Notes pertinent detail in written instructions, especially amounts and strengths of medications to administer; accurately perceives numbers when reading instruments, preparing medications, and filling syringes for injections; accurately records data on patients' charts, such as temperature, respiration, pulse count, blood pressure, medications, and dosage administered.

Level 3

Q-3:1 Prepares and compiles records in hospital nursing unit, such as obstetrics, pediatrics, or surgery:

Clerical perception is required to post information to patients' charts from doctors' and nurses' notes and laboratory reports; to file charts in chart racks; to make up daily diet sheet for unit; and to maintain inventory of drugs and supplies.

Q-3:2 Drives truck over established route to deliver, sell, and display products or render services:

Clerical perception is required to fill out requisitions for merchandise and to check amounts received against requisition; to prepare sales slips for amounts sold, entering proper amount beside item listed on sales slip; and to avoid perceptual errors when computing total of sales and preparing reports of daily sales and collections.

Q-3:3 Marks or affixes trademark or other identifying information, such as size, color, grade, or process code on merchandise, material, or product:

Clerical perception is required to check specification to determine label and other information to be stamped on product; to select appropriate type and other symbols and place them in type box in order; and to compare sample to specification.

Q-3:4 Operates cash register to compute and record total sale and wraps merchandise for customers in department, variety, and specialty stores:

Clerical perception is required to record accurately amount of sale on cash register; to compare sales slip with price tickets on merchandise; and to copy cash register totals onto daily sales and receipt records.

Q-3:5 Assists in care of hospital patients, under direction of nursing and medical staff:

Clerical perception is required to read and record such data as temperature, pulse rate, and respiration rate; to record patient's food and fluid intake and output; and to read charts and instructions accurately.

Q-3:6 Performs combination of duties involved in binding books, magazines, pamhlets, directories, and catalogs:

Clerical perception is required to lay signatures on gathering table in correct page order for assembly; to gather up signatures in numerical order to form complete book body; and to inspect bound book bodies for proper pagination.

Level 4

Q-4:1 Coordinates and expedites flow of materials, parts, and assemblies within or between departments, in accordance with production and shipping schedules or department supervisors' priorities:

Clerical perception is required to compare part of material numbers or identification numbers to identical numbers on shop order when locating items; and to take physical inventories of stock, tool, or equipment storage rooms, comparing inventory number or other identifying number to inventory list.

Q-4:2 Inspects finished glassware or flat glass for conformance to quality standards:

Clerical perception is required to read micrometers and gages accurately to determine if dimensions are within specified tolerances; and to record number and types of defects.

Q-4:3 Drives gasoline- or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, or trailer hitch to push, pull, lift, stack, or tier merchandise, equipment, or bulk materials in warehouse, storage yard, or factory:

Accurately perceives identification numbers and weights marked on materials, packing cases, or tote boxes to identify materials to be moved and to assure that weight of items lifted does not exceed vehicle capacity.

Q-4:4 Marks, sorts, and records number and type of soiled garments, linens, and other articles received for cleaning and laundering:

Clerical perception is required to enter number of each type of garment or article on laundry list; to write or stamp identification number or code on article or tag; and to accurately record identification number on laundry slip.

Q-4:5 Assists workers in business office by sorting, distributing, and collecting mail and interoffice correspondence and delivering office supplies to workers:

Avoids perceptual errors in reading names and addresses on mail in order to deliver it to proper destination.

Q-4:6 Sets up and operates coil winding machine to wind coils used in manufacture of electrical and electronic components, such as transformers, solenoids, chokes, and filters:

Clerical perception is required to observe counter and to stop machine after specified number of turns; and to read ohmmeter attached to resistance coil, winding or unwinding wire until specified resistance reading is obtained.

Q-4:7 Sells furniture, beds, and mattresses in department store or furniture store:

Clerical perception is required to avoid perceptual errors when making up bills of sales; when reading and recording identification numbers to make up inventory of stock; and when requisitioning stock from warehouse or checking on its availability.

Level 5

Q-5:1 Wears signboards and walks in public to advertise merchandise, services, or belief:

Clerical perception is required to recognize and relate addresses to assigned route.

Q-5:2 Delivers telephone directories to residences or business establishments on foot:

Clerical perception is required to match addresses to those on delivery list.

K - MOTOR COORDINATION: The ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly.

Interpretive Information for Analysts: Motor coordination involves hand movements guided by concentrated visual attention. It is present when objects are guided into position or parts are assembled. Typing and operating adding machines, calculators, and similar keyboards are examples of K in clerical occupations.

Level 1

No illustrations.

Level 2

K-2:1 Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy:

Eye-finger coordination is required to type by "touch," with the fingers striking the appropriate keys as the eyes follow the copy.

K-2:2 Itemizes and totals cost of customer's purchases of groceries, meat, and produce on a combination adding machine-cash register:

Motor coordination is required to coordinate finger, eye, and hand with speed.

K-2:3 Diagnoses and treats diseases, injuries, and malformations of the teeth, gums, and related oral structures:

Motor coordination is essential in using drills and other dental tools to extract, fill, or cap teeth; in positioning novocaine needle in gums; and in fitting artificial teeth, plates, and bridges.

K-2:4 Operates pantograph machine to transfer design in reduced form from zinc plate to varnished printing rollers:

Coordination between eyes and fingers is required in guiding needle point through line of design cut on plate to trace pattern on printing roll; and for moving stylet to follow colored lines in etched pattern.

K-2:5 Pairs finished hose according to grade, color, size, and length:

Holds heel at bottom seam and measures heel and length of stocking by holding against measuring lines on pairing table to ascertain specific lengths, matches, or pairs stacking on top of another to match two stockings that are identical in heel, length, and welt measurements. Works at production pace; and coordination of eyes, hands, and fingers is required for measuring and matching.

K-2:6 Installs, repairs, adjusts, and calibrates pneumatic, electrical, and electronic instruments;

Motor coordination is required in using handtools to adjust or repair component parts of electronic instruments; to test and calibrate reassembled equipment with electrical testing devices; and to rewire and modify equipment in accordance to blueprints and schematics.

K-2:7 Works at discharge end of conveyor belt to inspect and box bakery products:

Motor coordination is required to remove products quicky from belt and place them in cartons according to specified arrangement.

Level 3

K-3:1 Operates telephone switchboard to establish or assist customer in establishing local or long distance telephone connections:

Motor coordination is required to press proper keys or plug jacks into holes or slots on switchboard quicky in response to visual stimuli or lights on board, and often with several calls coming in and going out simultaneously.

K-3:2 Assembles electrical equipment, such as ammeters, galvanometers, and voltage meters:

Close correspondence is required between eyes and hands in using tools to position, adjust and tighten parts, such as screws, indicator arms, springs, and lugs.

K-3:3 Performs beauty services for patrons of beauty shop:

Coordination of eyes, hands, and fingers is required to cut, style, and tint hair, give facials, arch eyebrows, and manicure nails.

K-3:4 Drives gasoline-powered forklift truck to haul or stock materials and/or objects in or about establishment:

Coordinates eyes and hands or fingers in making precise movements with speed (pushing and pulling hand levers, gear shifts, and hand brakes) to drive truck and to raise, lower or otherwise position forklift under objects to be moved.

K-3:5 Removes defective nuts and foreign matter from bulk nut meats:

Coordinates eye, hand, and finger movements to pick up and discard defective nut meats and foreign matter from conveyor belt, working at production rate.

K-3:6 Cuts, trims, and bones meats to prepare them for cooking, using knives, saw, and cleaver:

Motor coordination is required in adjusting saw blades; in cutting, boning, and trimming meats into desired portions with knives; and placing meats in grinders and cubing machines.

K-3:7 Assembles metal products, such as vacuum cleaners, valves, or hydraulic cylinders, working at bench or on shop floor:

Motor coordination is required in operating drill presses, punch presses, riveting machines, and various handtools in assembly operations; and in positioning, placing, and fitting of parts in each sub-assembly and main assembly.

K-3:8 Applies coats of plaster to interior walls, ceilings, and partitions of buildings to produce finished surface:

Motor coordination is essential in erecting scaffolding, mixing plaster to desired consistency, spreading plaster so as to attain uniform thickness, and creating decorative textures in finished coat by marking with brush or trowel.

K-3:9 Forms wire grids used in electron tubes, using winding, shaping, and cutting machines:

Motor coordination is required to coordinate eyes and fingers or hands to insert grid into chucks, to trim grids, and to thread wires through lathe.

Level 4

K-4:1 Repairs defects, such as tears and holes in garments, linens, curtains, and draperies, and rebinds cleaned blankets by hand or by operating a sewing machine:

Eye and finger coordination is required in sewing, darning, or reweaving holes or tears in garments, curtains, or linens.

K-4:2 Performs tasks to finish and press household linens:

Motor coordination is required in placing garments into machine, making sure garments are properly alined so that no wrinkles will be ironed into garments.

K-4:3 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines:

Motor coordination is required to aline workpiece and cutting tool in relation to one another; to move levers when operating machines; and in using handtools to perform such functions as chipping, filing, and scraping.

K-4:4 Assembles various aluminum or steel components of trailers:

Motor coordination is required to aline and position trailer components to fit rivets, bolts, and screws into position, using riveting gun and handtools, and to fit trailer parts in prescribed position for correct assembly.

K-4:5 Receives, stores, and issues equipment, material, supplies, merchandise, foodstuff, or tools, and compiles records in stockroom, warehouse, or storage yard:

Coordinates eyes, hand, and finger movements to wrap or box items and label packaged parts.

K-4:6 Harvests fruit, working as crew member:

Coordinates hands and eyes to make necessary movements in selecting, picking, and depositing fruit into picking sack.

K-4:7 Operates traveling and stationary tables to feed steel blooms, billets, and slabs to rolls for successive passes through roll stands:

Eye-hand coordination is required to position tables and aline rollers preparatory to feeding steel into rollers.

Level 5

K-5:1 Removes sealed cans or jars of food products from conveyor and dumps or stacks them in metal basket:

Coordinates eye, hand, and finger movements to pick up cans or jars from conveyor and stack them in basket, working at a production rate.

K-5:2 Picks bones from offal as it passes on conveyor belt and tosses bones onto conveyor:

Coordinates eye, hand, and finger movements to separate, pick up, and deposit bones on second conveyor, working at a production rate.

F - FINGER DEXTERITY: The ability to move the fingers, and manipulate small objects with the fingers, rapidly or accurately.

Interpretive Information for Analysts: Finger dexterity is present when bolts and screws are handled; small tools, machine controls, and the like are manipulated; musical instruments are played; and fine adjustments and alinements are made to instruments and machines. It may or may not be accompanied by visual stimuli.

Level 1

F-1:1 Plays organ in recital, as accompanist, or as member of orchestra, band, or other musical group:

All ten fingers must be positioned in rapid integrated movements to depress specified keys at varying tempos on one or more keyboards of organ.

F-1:2 Performs surgical operations upon human body:

Finger movements of one hand are required to locate broken or cut blood vessel, to position vessel and place ligature about it, and to tie one of several types of knots in ligature to stem flow of blood from vessel.

Level 2

F-2:1 Sets up and operates coil-winding machine to wind multiple coils used in manufacture of electrical and electronic components:

Positions and moves very small parts and thin wires with fingers and fits coil forms on widing arbor of machine; threads wire through guide mechanism of machine; and tapes wire to coil forms.

F-2:2 Adjusts watch movements to comply with mechanical and timing specifications:

Controls placement and movement of watchmaker tools and watch components with fingers in disassembling and cleaning watch movements; in adjusting lock, drop, and slide of escapement; in truing wheel and hairspring assembly; and in reassembling watch movements.

F-2:3 Installs optical elements, such as lenses, prisms, and mirrors in mechanical portion of such instruments as telescopes, cameras, and gunsights:

Finger dexterity is required to guide and move tools and to position component parts in performing such tasks as scraping, filing, and lapping instrument mounts to aline optical elements; adjusting optical elements to calibrations; and inserting retaining rings into housings and securing them to posts or threads.

F-2:4 Assembles modules (units) of microelectronic equipment, such as satellite communications devices and hearing aids, using handtools, magnifying lens, and spotwelder:

Finger dexterity is required to insert lead wires of components, such as microdiodes, resistors, capacitors, and microtransistors, into mounting holes of plastic plate; and to attach color-coded wires between specified component leads to make circuit connections.

F-2:5 Engraves lettering and ornamental designs on silverware, trophies, eyeglass frames, and jewelry, using engraving tools:

Finger dexterity is required to position and control movements of engraving tools in cutting complicated designs on objects, such as pins, rings, and bracelets.

F-2:6 Packages pharmaceutical products by hand:

Finger dexterity is required in performing such tasks as inserting cotton in mouths of bottles, placing caps on bottles, pasting labels on bottles, inserting bottles into nested cartons, placing printed material in filled cartons, and packing individual cartons into larger cartons.

F-2:7 Makes women's garments such as dresses, coats, and suits, according to customer specifications and measurements:

Finger dexterity is required in performing such tasks as positioning and pinning pattern sections and fabric; pinning or basting together fabric parts in preparation for sewing; and threading needle and sewing parts together by hand.

F-2:8 Diagnoses and treats diseases, injuries, and malformations of teeth, gums, and related oral structures:

Finger dexterity is required to position and guide dental picks and mirrors; position X-ray film in patient's mouth; suture extraction wounds; and trim and carve bite blocks with spatulas and carving instruments.

Level 3

F-3:1 Feeds tungsten filament wire coils into machine that mounts them to stems in electric light bulb:

Finger dexterity is required to grasp coils with tweezers and insert them into slotted plate of mounting machine; and to pick up and examine finished mounts as they emerge from machine.

F-3:2 Takes dictation in shorthand and transcribes dictated materials, using typewriter:

Finger dexterity is required in forming shorthand symbols with pencil or pen and in depressing keys of typewriter.

F-3:3 Installs, maintains, and services sound and communication systems:

Finger movements are required in performing such tasks as picking up and installing tubes, transistors, and component parts; wiring units of system together; and turning dials to obtain required performance level.

F-3:4 Cuts and styles hair using clippers, comb, and scissors and performs other personal services for patrons of barber shop:

Controlled movement of fingers is required to use clippers, scissors, and other barber tools when cutting and shaping hair.

F-3:5 Operates battery of looms to weave yarn into cloth:

Finger dexterity is required to repair breaks in warp fiber by tying piece of yarn to broken end of warp and threading yarn through drop wires, needle eyes, and reed dents, using reed hooks.

F-3:6 Constructs and repairs dental appliances:

Finger dexterity is required in performing such tasks as sketching outline of appliance on stone model, alining model on articulator and securing it to frame with plaster, and building wax impressions of metal frames, crowns, partials, and full dentures.

F-3:7 Packs agricultural produce, such as bulbs, fruits, nuts, eggs, and vegetables, for storage or shipment:

Finger dexterity is required in performing such tasks as lining containers with padding, inserting separators in containers, sorting produce according to size and color, wrapping material around produce, and placing produce in containers.

F-3:8 Welds metal parts together, using electric and oxyacetylene welding equipment:

Finger movements are required to connect pressure regulators to nozzles of oxygen and acetylene supply tanks; connect hoses to regulators and welding torch to hose; screw welding tip into torch; and to open regulator valves and light torch.

Level 4

F-4:1 Mixes and bakes ingredients according to recipes to produce breads, pastries, and other baked goods:

Finger dexterity is required to work with ingredients and utensils and to perform such tasks as arranging strips of dough across tops of pies, and placing cut or formed dough in pans or on baking boards or trays.

F-4:2 Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in medical institutions:

Finger dexterity is required in using knives, brushes, scrapers, and other tools to clean, trim, slice, and dice vegetables, fruits, and meats; in portioning foods; in turning dials and valves on kitchen equipment; in removing dishes, napkins, and waste materials from food carts; in sorting and stacking dishes; and in lining pans and shelves with paper.

F-4:3 Sews fasteners and decorative trimmings to articles, sews buttonholes, and joins articles, using needle and thread:

Finger dexterity is required to thread needle, aline articles, and hold articles in place while sewing.

F-4:4 Controls continuous operations of petroleum refining and processing units:

Finger dexterity is required to move knobs, buttons, and switches on control panels; to place charts, tapes, and graphs in recording part of instruments; and to set control arms and needle points in proper recording positions.

F-4:5 Repairs and maintains physical structures of commercial and industrial establishments, using handtools and power tools:

Finger dexterity is required to perform such tasks as making electrical repairs that involve splicing broken lines; installing switches, receptacles, and junction boxes; and replacing fuses.

Level 5

F-5:1 Cleans outside surfaces and inside drawers of furniture, using airhose and cloth, to remove dust, dirt, and chips preparatory to spray finishing:

Finger dexterity is required to operate airhose and remove debris from narrow or constricted spaces.

F-5:2 Strings jewelry articles on wire or hangs articles on racks preparatory to further processing, such as soldering, cleaning, plating, or stripping, and carries to machine operator:

Finger dexterity is required to manipulate small articles of jewelry quickly and accurately.

M - **MANUAL DEXTERITY:** The ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions.

Interpretive Information for Analysts: Manual dexterity involves working with the arms and hands. It is present when objects are moved or stacked by hand or in other situations in which wrists and hands are used in turning and placing movements.

Note: Finger movements (Finger Dexterity) may or may not accompany the exercise of manual dexterity.

Level 1

No illustrations.

Level 2

M-2:1 Entertains audience by juggling and balancing objects:

Manual dexterity is required to throw, catch, handle, and balance three to five objects, such as balls, knives, tenpins, and chinaware.

M-2:2 Installs, repairs, maintains, and adjusts indicating, recording, telemetering, and controlling instruments used to measure and control variables, such as pressure, flow, temperature, motion, force, and chemical composition, using handtools and precision instruments:

Assembly, disassembly, and calibration of instruments require placing and turning movements of the hands. Works with handtools, such as screwdrivers, wrenches, and pliers, and bench tools, such as jeweler's lathe, pin vises, small buffer grinders, and ultrasonic cleaners, in repairing instruments.

M-2:3 Inspects eggs to ascertain quality and fitness for consumption or incubation, according to prescribed standards:

Manual dexterity is required to pick up eggs from cardboard cases, roll and shift eggs within palm while inspecting them, and place acceptable eggs on shuffler rack while working at production-line pace.

M-2:4 Fabricates, assembles, installs, and repairs sheetmetal products and equipment, such as control boxes, drainpipes, ventilators, and furnace castings, according to work orders or blueprints:

Manual dexterity is required to manipulate such tools as outline cutting torches, power hacksaw, slitting shear, and various hand drills to accomplish general work processes as cutting, forming, folding, grooving, bending, punching, and drilling holes; and to place workpiece in holding fixture, operate tool, and remove workpiece from machine.

M-2:5 Constructs and repairs metal-forming tools, dies, jigs, fixtures, and gages, shaping parts with various metalworking machines and fitting them together, using handtools:

Manual dexterity is required in setting up machines; in building tool holding devices; in fitting and assembling tools, gages, and other mechanical equipment; and in performing such tasks as chipping, filing, scraping, and polishing surfaces of mechanical parts.

M-2:6 Sets up and operates drum-type machine to build pneumatic automobile tires according to specifications:

Manual dexterity is required in handling, placing, and guiding product components and tools in the process of tire building; in applying cement stick to drum; in tearing the measured length of ply stock from roll and wrapping ply around drum; in guiding stock while drum is rotated; in lapping ends of ply; and in smoothing tight splice.

M-2:7 Diagnoses and treats disease, injuries, and malformations of teeth, gums, and related oral structures:

Accurate and flexible wrist movements are required when using drills and other dental tools to extract, fill, or cap teeth; positioning novocaine needle in gums; and fitting artificial teeth, plates, and bridges.

M-2:8 Works at conveyor belt to package previously filled bottles, tubes, and boxes of pharmaceuticals by hand in individual or nested cardboard boxes:

Uses placing and turning hand movements in putting empty containers on conveyor belt; removing filled packages from conveyor; and packaging smaller containers in larger packages while maintaining a continuous production pace in all operations.

Level 3

M-3:1 Repairs and rebuilds upholstered furniture, using handtools and knowledge of fabrics and upholstery methods:

Manual dexterity is required in using handtools; in handling and assembling spring units; in building up and securing padding; and in handling, positioning, and securing covered material.

M-3:2 Sets up, inspects, and repairs looms to weave cloth:

A variety of hand and wrist movements are required to adjust screws and levers, install gears, tighten bolts, and to repair and replace various mechanical parts of machine.

M-3:3 Drives gasoline- or electric-powered industrial truck, equipped with forklift, to push, pull, lift, stack, or tier equipment in warehouse, storage yard, or factory:

Manual dexterity is required to push and pull levers on truck, turn steering wheel, and stack materials on truck.

M-3:4 Tends machine that coats continuous rolls of wire, strips, or sheets with wax, paint, rubber, asphalt, or other coating material:

Manual dexterity is required in handling control levers; guiding strips into machine and onto rewind coils; repairing broken splices by hand; and in using small handtools to change degreasing pads and squeeze rollers.

M-3:5 Assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks, and vats in the field, following blueprints and using handtools and power tools:

Uses placing and turning hand movements in alining and fitting structures or plate sections in assembling boiler frames; in handling plumb bobs, levels, wedges, dogs, and turn buckles; and in riveting, welding, and caulking.

M-3:6 Sorts and segregates fruit, working as a crew member:

Manual dexterity is required to place liners in boxes; grasp fruit and paper, and wrap fruit; and pack wrapped fruit in proper position in container.

M-3:7 Lays building materials to construct or repair walls, partitions, arches, sewers, and other structures:

Manual dexterity is required to manipulate equipment and tools; place and stack material; erect scaffold; mix and spread mortar; cut bricks; and embed iron rods in mortar.

M-3:8 Operates machine to press face of composed type and plates into wood fiber mats to form stereotype casting mold for printing:

Manual dexterity is required to manipulate tools to trim, plane, level, saw, and shave plates for printing.

Level 4

M-4:1 Harvests fruit, working as crew member:

Manual dexterity is required to position sizing loop around lemons; to clip lemons from stem; and to deposit lemons in boxes.

M-4:2 Repairs and maintains physical structures of commercial and industrial estalishments, using handtools and power tools:

Manual dexterity is required in repairing and maintaining woodwork and furniture; making electrical repairs; patching and repairing cement, and making minor plumbing and pipe repairs.

M-4:3 Removes stems from tobacco leaves to prepare tobacco for use as filler, binder, or wrapper for cigars, plugs, or twist chewing tobacco:

Manual dexterity is required in the hand operation of picking up handful of tobacco, selecting single leaf, spreading it open and holding leaf with one hand while pulling out stem with other hand.

M-4:4 Finishes household linens, such as sheets, pillowcases, tablecloths, and napkins:

Manual dexterity is required to shake, sort, fold, and stack laundry; to tie bundles of laundry together; and to feed and guide material into ironer.

M-4:5 Directs the operation of battery of stills to distill crude oil:

Manual dexterity is required to turn knobs and switches on control panel; to position charts, tapes, and graphs in recording part of instruments; and to turn wheels and valves on the still and auxiliary equipment.

M-4:6 Tends circular knitting machine with automatic pattern controls that knit seamless hose:

Manual dexterity is required to pull hose over hands during operation; separate hose; stack yarns; thread yarn through proper channels when thread breaks; and to clean grease, lint, oil, etc., from machine.

M-4:7 Sorts rags and old clothing:

Manual dexterity is required to rip off buttons, pockets, hooks and eyes, snaps, and other foreign matter.

Level 5

M-5:1 Removes sealed cans or jars of food products from conveyor and dumps or stacks them in metal basket:

Manual dexterity is required to pick up cans or jars from conveyor and to place or stack them in basket.

M-5:2 Places tobacco tin over form and beats with hammer or mallet, or uses straightening device to remove dents from tins:

Manual dexterity is required to pick up and place tins over forms, and to manipulate hammer or mallet.

E - EYE-HAND-FOOT COORDINATION: The ability to move the hand and foot coordinately with each other in accordance with visual stimuli.

Interpretive Information for Analysts: This factor involves using eyes, hands, and feet coordinately. Unless there is definite coordination of hand and foot movements with what the eye sees, this factor is not present.

Level 1

E-1:1 Performs gymnastic feats of skill and balance while swinging on a trapeze, turning somersaults, or executing flying stunts alone or as member of team:

Coordinates hand and foot motions with visual stimuli, in order to reach for and grasp approaching bar or other aerialist while standing on or hanging from another swinging bar.

E-1:2 Performs ballet dances alone, with partner, or in group to entertain audience:

Coordinates feet and hands with vision in order to interpret dance role and to move in specified relationship with other members of cast; in positioning arms and hands in coordination with other movements to achieve desired interpretive effect or expression, to maintain balance, or to lift, carry, or support other dancer.

E-1:3 Plays professional baseball:

Coordinates movements of hands and feet with what eye sees when catching, hitting, and throwing ball.

E-1:4 Instructs groups at playgrounds and schools in fundamentals and rules of competitive sports:

Coordination of hand and foot movements with visual stimuli is required to demonstrate, by example, techniques of play for various sports and movements and body positions which result in best execution of a particular "play" or maneuver.

E-1:5 Creates or interprets music on drum, as member of orchestra, band, or other musical group, to entertain audiences:

Eye-hand-foot coordination is required to hit or stroke drum heads with drum sticks or brushes and depress pedals to activate other drums and cymbals simultaneously, while following musical score and conductor's baton.

Level 2

E-2:1 Pilots airplane to transport passengers, mail, freight, or for other commercial purposes:

Coordinated movements of hand and foot controls, in accordance with observed conditions of aircraft or external factors or conditions indicated by instrument readings, is required to take over control of airplane in emergency or override programmed control in case of malfunction, to taxi, take off, land, and control aircraft in flight.

E-2:2 Operates several types of powered construction equipment, such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers, or graders, to excavate and grade earth, erect structural and reinforcing steel, and pour concrete:

Moves hand and foot controls in coordination with vision and each other to drive and steer machines and move materials into position.

E-2:3 Prunes and treats ornamental and shade trees and shrubs in yards and parks to improve their appearance, health, and value:

Eye-hand-foot coordination is required to climb trees or ladders and balance self while topping trees to control growth, sawing off dead, diseased, or undesirable limbs; scraping and filling cavities in trees with cement; and painting cut surfaces to seal them against insects and disease.

E-2:4 Raises, positions, and joins girders, columns, and other structural steel members to form completed structures or frameworks, working as member of crew:

Eye-hand-foot coordination is required to work above ground level while balancing on ladders, scaffolding, or structural members while raising, positioning, fitting, and joining structural pieces.

Level 3

E-3:1 Attends to beef cattle on stock ranch:

Coordinates arm-hand and leg-foot motions with vision when riding horse to round up strays or to rope cattle; and to pin and tie down calves for branding.

E-3:2 Drives gasoline- or diesel-powered tractor-trailer truck combination, usually over long distances on highways, to transport and deliver goods, livestock, or materials in liquid, loose, or packaged form:

Eye-hand-foot coordination is required to operate clutch, brake, and accelerator pedals, gear-shift level, and steering wheel to guide tractor-trailer on highways and streets, turn corners, negotiate narrow passageways, and backing up to warehouse, terminal, or other loading docks.

E-3:3 Maintains and repairs mercury-vapor, electric-arc, flourescent, or incandescent street lights or traffic signals:

Coordinates hand and foot movements with vision to climb ladder to reach lamp, or stand in tower-truck bucket moving levers to position bucket near lamp; to maintain balance while using hands and vision to test circuits, locate broken wires, and replace fuses, bulbs, and transformers.

E-3:4 Renders variety of personal services conducive to safety and comfort of airline passengers during flight:

Coordinates hand and foot movements with vision to serve food and beverages without spilling them; and to walk in aisle, when airplane encounters rough weather, carrying trays or other items.

E-3:5 Loads and unloads ships' cargoes:

Coordinates hand and foot motions with vision when guiding slings used to lift cargo to avoid tripping and to keep load from swinging and bumping into other objects; when standing on ladders, platforms, or other objects to stack and arrange cargo high in hold; and to store cargo in ship's hold to prevent shifting during voyage.

Level 4

E-4:1 Tends machine that crimps eyelets, grommets, snaps, buttons, or similar fasteners to material such as cloth, canvas, paper, plastic, leather, or rubber to reinforce holes and attach fasteners or parts:

Coordinates hand and foot motions with vision when positioning material, fasteners, and ram of machine, while depressing foot pedal to activate ram which crimps fastener to material.

E-4:2 Parachutes from airplane into forests to suppress forest fires:

Coordinates hand and leg movements with vision to pull shroud lines and collapse chute while landing in manner to reduce impact and to prevent being dragged by chute.

E-4:3 Operates pressing machine to smooth surfaces, flatten seams, or shape articles, such as garments, drapes, slipcovers, and hose, in manufacturing or drycleaning establishment:

Simultaneous eye-hand-foot coordination is required to step on foot pedal, pull down on pressing head while observing garment to see that it does not slip out of position on press buck; to hold pedal down with foot to keep press head against garment; to press level with fingers to emit steam from press head; and to keep pressure on press head handle to raise counterbalanced head gently, while stepping on second pedal to exhaust steam to cool and dry garment.

Level 5

E-5:1 Ties bunches of forest greenery together for eventual sale to consumer by placing greenery in pressure clamp and presses pedal to hold bunches together while tying:

Coordinates hand and foot movements with vision to position greenery, to place bundles in clamp, to depress clamp with foot, and to tie greenery.

E-5:2 Turns articles, such as clothing, clothing parts, coin purse linings, stuffed toy shells, or textile bags, right side out:

Eye-hand-foot coordination is required to place article over holding device; to fold end of article over rod; and to depress pedal while pulling upward to reverse article.

C - **COLOR DISCRIMINATION:** The ability to match or discriminate between colors in terms of hue, saturation, and brilliance. Ability to identify a particular color or color combination from memory and to perceive contrasting color combinations.

Saturation: Refers to the purity of color. Some colors have greater purity or amount of a certain color than others; that is, they have a more pronounced hue. For example, deep red is more "reddish" than light red.

Hue: Refers to the color itself and is dependent upon the dominant wavelength in any spectral energy distribution. It is that quality that differentiates the "blues," "greens," "reds," etc.

Brilliance: Refers to the brightness of a color. It is the amount of light reflected from a surface and can range from high to low, as when comparing a white snowflake with a mark made by a lead pencil.

Color Matching: Varying the components of a color mixture until it does not differ visually from a given sample.

Color Memory: The ability to retain an accurate visual image of a color and to be able to use it as a basis for matching and discriminating.

Interpretive Information for Analysts: Color discrimination may rely on one or a combination of the following: Identification of differences and similarities in colors from memory; using a visual standard against which colors can be matched or identified; or reproduction of colors using knowledge of color combinations.

Level 1

C-1:1 Develops color formulas for printing textile and plastic materials and plans and directs activities of color shop:

Color discrimination is required to select and combine appropriate dyestuffs and pigments to achieve desired colors, distinguish minute differences in shades, and visualize the hue and brilliance which will result from mixing the primary colors in various proportions.

C-1:2 Paints portrait of person, usually in oil, on canvas, using living subject:

Color discrimination is required to combine paints and oils to develop colors which accurately reproduce coloring of subject; and to apply these colors on canvas in combinations of light and shade which give lifelike effect.

C-1:3 Studies production requirements, such as character, period, setting, and situation, and applies makeup to performers to alter their appearances in accord with their roles:

Examines sketches, photographs, and plaster molds to form color image of characters to be depicted, selecting prostheses, cosmetics, and makeup materials, such as wigs, beards, rouge, powder, and grease paint, and applies these to change such physical characteristics of performers as facial features, skin texture, and coloring to produce effect appropriate to depict character and situation.

C-1:4 Performs surgery to correct deformities, repair injuries, prevent diseases, and improve functions in patients:

Uses color discrimination and color memory in making diagnosis of patients' affliction or condition, by recognizing any deviations in color of diseased tissue from healthy tissue; evaluating color characteristics, such as hue and saturation of affected body parts; and making determination as to extent or origin of condition.

C-1:5 Reweaves damaged areas of oriental or other expensive rugs, following color, pattern, and weave of rug:

Color discrimination is required to perceive color scheme of rug so that proper alterations can be made which are consonant with rug's total color configuration, and to select yarn which is equivalent in color to that in rug.

Level 2

C-2:1 Mixes stains, paints, and other coatings for use in painting according to formulas:

Color discrimination is required to detect any differences in color between mixture and sample and to rectify the color differences by adding pigment until exact shade is produced.

C-2:2 Investigates properties and treatment of metals to develop new alloys, new uses for metals and alloys, and methods of producing them commercially:

Spectroscopic study of metals and alloys requires ability to discriminate between various colors and shades of same color as they are refracted onto screen, and to judge dispersion of alloy particles and their relative purity by means of color emission.

C-2:3 Plans and designs artistic interiors for homes, hotels, ships, commercial and institutional structures, and other establishments:

Is well informed on outcome of blending various colors in interior decorating and capable of choosing color schemes which are harmonious with each other and particular setting.

C-2:4 Changes undesirable details of illustration copy whch is to be reproduced by lithographic process:

Compares negative or positive with original copy to determine color correction, silhouetting, or opaquing requirements; prepares dye or other chemicals; and intensifies or reduces unsatisfactory tone values in film or glass by adding color to lithographic plates to achieve required hue.

C-2:5 Studies effects of drugs, gases, dusts, and other materials on tissues and physiological processes of animals and human beings:

Color shades and hues are used as basis for drawing valid conclusions about effect of drug or stain; and color matching is required when preparing two solutions of equal concentration or proportion.

C-2:6 Prepares stuffs, and mounts skins of birds or animals in lifelike form:

Color memory is required in painting eyes, teeth, claws, and feathers to enhance lifelike appearance of specimen, and in dressing-out, embalming, or otherwise preparing animal carcasses.

C-2:7 Molds pulverized marble, metallic oxides or pigment, cement, and water in specific pattern to form terazzo tile:

Color discrimination is essential in apprehending color values of pattern to be depicted; and color matching is required in mixing pigment, cement, and water, so that finished tile is equivalent in terms of color to that of standard.

Level 3

C-3:1 Examines and grades pieces of leather to make articles, such as garments, gloves, and mittens according to specifications:

Color discrimination is required to match color of leather in each grade so that it is equal in terms of hue, saturation, and brilliance.

C-3:2 Examines pearl buttons and sorts them according to grade:

Color discrimination is required to observe buttons on conveyor belt or worktable, at production line pace; and to sort them into containers according to shade and purity of color and degree of irridescence.

C-3:3 Tests temperature of glass melting furnaces and regulates gas and air supply to maintain specified temperature:

Observes color of flame through opening of optical pyrometer and turns dial on pyrometer until color of wire filament matches luminosity of flame. This color matching technique requires the worker to be able to make discrimination in color between the flame and wire filament.

C-3:4 Tests milk to determine bacterial count, percentage of butterfat, and amount of acid in milk of each cow in herd:

Measures out specified amount of ethylene blue and observes time required for blue color to disappear in determining bacterial count; and discriminates between various shades of red and blue when using pH indicator.

C-3:5 Displays and sells cotton, linen, rayon, silk, and wool yard goods:

Color discrimination is necessary to distinguish between different shades and colors of fabrics in filling customers' orders; and to match fabrics for color.

Level 4

C-4:1 Performs various tasks in a fish hatchery:

Uses color discrimination and matching to sort fish according to size, coloring, and species, in transferring them to proper tanks.

C-4:2 Arranges tiles into designs for such use as floor or sink tops and pastes paper on tile to preserve arrangement of design:

Is able to discriminate between colors in order to insert individually colored tiles in slots following sample design.

C-4:3 Inspects furniture and parts for defects:

Color matching is required in verifying color of furniture against work ticket specifications; and in detecting differences in shade of same color so that defective workmanship can be discovered.

C-4:4 Cuts and trims meat to size for display or as ordered by customer, using handtools and power equipment:

Is able to distinguish different shades and colors in selecting meats according to customer's specifications and in inspecting meats for quality.

C-4:5 Inspects sample lots of varnish for acids, color, clearness, cracks, crystallization, sediment, and drying qualities, to ascertain whether varnish conforms with specifications before packing process:

Uses color discrimination and matching to compare sample varnish with standard varnish for any discrepancies in color.

Level 5

C-5:1 Cuts seed potatoes into sections of uniform size for mechanical planting:

Uses color discrimination to recognize discolored sections and determine product spoilage.

C-5:2 Picks bones from offal as it passes on conveyor belt and tosses bones onto conveyor:

Color discrimination is required to quickly distinguish bones from offal.

CHAPTER 12

INTERESTS

Page

Estimating Interests 313

Definitions and Examples of the Interest Factors 314

- 01 - Artistic 314
- 02 - Scientific 314
- 03 - Plants and Animals 314
- 04 - Protective 315
- 05 - Mechanical 315
- 06 - Industrial 316
- 07 - Business Detail 316
- 08 - Selling 316
- 09 - Accommodating 317
- 10 - Humanitarian 317
- 11 - Leading - Influencing 317
- 12 - Physical Performing 318

CHAPTER 12

INTERESTS

An interest is a liking or preference for an activity. The 12 interest factors used by the United States Employment Service in job analysis are:

01	Artistic
02	Scientific
03	Plants and Animals
04	Protective
05	Mechanical
06	Industrial
07	Business Detail
08	Selling
09	Accommodating
10	Humanitarian
11	Leading-Influencing
12	Physical Performing

Numerous studies have indicated a significant correlation between job stability and satisfaction, and positive interest in the type of work being performed. New interest factors which are based on more recent and comprehensive research[1] have replaced the Cottle interest factors,[2] which were used in the 1972, edition of the *Handbook for Analyzing Jobs*.

Eleven of the new interest factors are the result of research conducted by the U.S. Employment Service's Division of Testing, which is validating an interest inventory to measure interests for counseling and related purposes. The twelfth factor, Physical Performing, was established to accommodate a small group of occupations in entertainment and recreation which could not be allocated to any of the other 11 factors. One or more of these 12 interest factors can be applied to every job in the economy.

Estimating Interests

Select the interest factors that apply to the job as a whole, based on a careful evaluation of the applicability of each factor to a significant aspect of the job. For each job assign a primary interest and, if applicable, up to two additional interests.

---

[1] Droege, Robert C. and Hawk, John, "Development of a U.S. Employment Service Interest Inventory," *Journal of Employment Counseling*, June 1977, pp. 65-69.

[2] Cottle, William C., "A Factorial Study of the Multiphasic, Strong, Kuder, and Bell Inventories Using a Population of Adult Males," *Psychometrika*, XV, March 1950; pp. 25-47.

Definitions and Examples of the Interest Factors

The 12 interest factors are defined below. Following each definition are examples of worker activities which illustrate the interest factor.

01 **Artistic:** Interest in creative expression of feelings or ideas.

- Examples:

Writes short stories, poems, or articles.

Restores and prepares exhibits of medieval arms and armor.

Poses for pictures taken by photographer to be used for advertising purposes.

Plays musical instrument as soloist or as member of musical group to entertain audience.

Designs and paints letters and designs to create signs.

02 **Scientific:** Interest in discovering, collecting, and analyzing information about the natural world and applying scientific research findings to problems in medicine, life sciences, and the natural sciences.

- Examples:

Analyzes information about wind, temperature, humidity, and land formations to predict weather.

Crossbreeds animals to obtain new combinations of desirable characteristics.

Conducts nutritional research to expand knowledge in one or more phases of dietetics.

Examines and treats patients for all physical problems, referring them to specialists when necessary.

Compounds and dispenses medications, following prescriptions issued by physician, dentist, or other authorized medical practitioner.

03 **Plants and Animals:** Interest in activities involving plants and animals, usually in an outdoor setting.

- Examples:

Raises poultry to produce eggs and meat.

Plans and executes small scale landscaping operation and maintains grounds and landscapes.

Supervises and coordinates activities of workers engaged in maintenance of stables and care of horses.

Combs, clips, trims, and shapes dogs' coats to groom dogs.

Drives trucks and tractors and performs variety of animal- and crop-raising duties, as directed, on general farm.

04 **Protective:** Interest in the use of authority to protect people and property.

- Examples:

Establishes procedures, prepares work schedules, and assigns duties for jailers.

Patrols assigned beat on foot, horseback, motorcycle, or in patrol car, to control traffic, prevent crime or disturbance of peace, and arrest violators.

Guards inmates in penal institution in accordance with established policies, regulations, and procedures.

Screens passengers and visitors for weapons, explosives, or other forbidden articles to prevent such items from being carried into restricted area of air terminal.

Monitors activities in swimming areas to prevent accidents and provide assistance to swimmers.

05 **Mechanical:** Interest in applying mechanical principles to practical situations, using machines, handtools, or techniques.

- Examples:

Directs and coordinates operation of electric-power-generating plant.

Pilots airplane to transport passengers, mail, or freight.

Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in hotels and restaurants.

Tends low-pressure boiler that supplies steam heat for office building.

Lubricates moving parts of vehicles, such as automobiles, buses, and trucks.

06 **Industrial:** Interest in repetitive, concrete, organized activities in a factory setting.

- Examples:

Sets up and operates power shear to cut metal objects.

Strings tennis rackets with synthetic fiber or animal gut strings.

Inspects magazines, catalogs, and pamphlets for defects.

Drives a fork-lift truck to move materials in a factory.

Assembles bicycles, using handtools and portable power tools.

07 **Business Detail:** Interest in organized, clearly defined activities requiring accuracy and attention to detail, primarily in an office setting.

- Examples:

Keeps complete set of records of financial transactions of establishment.

Receives and pays out money and keeps records of money and checks involved in banking transactions.

Accepts and pays off bets placed by patrons of racetrack or bookmaking establishment.

Operates on-line computer typewriter terminal to transmit data to or to receive data from computers.

Supervises and coordinates activities of workers engaged in maintaining office files.

08 **Selling:** Interest in bringing others to a point of view through personal persuasion, using sales and promotional techniques.

- Examples:

Sells classified and display advertising space for publications.

Estimates pawn or pledge value of articles and lends money to customer.

Solicits orders for merchandise or services over telephone.

Persuades nightclub and restaurant patrons to pose for pictures and operates camera to photograph them.

Sells refreshments, programs, and novelties at sports events, parades, or other entertainments.

09 **Accommodating:** Interest in catering to the wishes and needs of others, usually on a one-to-one basis.

- Examples:

Performs variety of personal services conducive to safety and comfort of airline passengers during flight.

Dresses hair according to latest style, following instructions of patron.

Drives bus to transport passengers over specified routes according to time schedule.

Mixes and serves alcoholic drinks to patrons of bar, following standard recipes.

Carries golf bags or pushes and pulls golf cart around golf course for players, handing clubs to players as requested.

10 **Humanitarian:** Interest in helping others with their mental, spiritual, social, physical, or vocational concerns.

- Examples:

Counsels and aids individuals and families requiring assistance of social service agency.

Renders general nursing care to patients in hospital.

Aids parents with child-rearing problems and children and youth with difficulties in social adjustment.

Administers first-aid treatment to and transports sick or injured persons to medical facility, working as member of emergency medical team.

Conducts religious worship and provides spiritual and moral guidance and assistance to congregation.

11 **Leading-Influencing:** Interest in leading and influencing others through activities involving high-level verbal or numerical abilities.

- Examples:

Teaches one or more subjects, such as English, mathematics, or social studies, to students in public or private secondary schools.

Conducts criminal and civil lawsuits, prepares legal documents, and advises clients of legal rights.

Directs and coordinates activities of industrial organization to obtain optimum efficiency and economy of operations.

Arbitrates disputes between labor and management to bind both to specific terms and conditions of contract.

Manages hotel or motel to insure efficient and profitable operation.

12 **Physical Performing:** Interest in physical activities performed before an audience.

- Examples:

Analyzes performance and instructs professional athletes in game strategies and techniques to prepare them for athletic competition.

Umpires baseball and softball games.

Performs difficult and spectacular feats, such as leaping, tumbling, and balancing, alone or as member of team, to entertain audience.

Rides horse in presence of judges in horse show.

Juggles and balances objects, such as balls, knives, tenpins, and hats, to entertain audience.

CHAPTER 13

TEMPERAMENTS

Page

Estimating Temperament Requirements of Jobs 322

Definitions and Examples of the Temperaments 322

- D - DIRECTING, Controlling, and/or Planning Activities of Others 322
- R - Performing REPETITIVE and/or Short-Cycle Work 323
- I - INFLUENCING People in their Opinions, Attitudes, and Judgments 323
- V - Performing a VARIETY of Duties 324
- E - EXPRESSING Personal Feelings 325
- A - Working ALONE or Apart in Physical Isolation from Others 325
- S - Performing Effectively Under STRESS 326
- T - Attaining Precise Set Limits, TOLERANCES, and Standards 326
- U - Working UNDER Specific Instructions 327
- P - Dealing with PEOPLE 327
- J - Making JUDGMENTS and Decisions 328

CHAPTER 13

TEMPERAMENTS

Temperaments are the adaptability requirements made on the worker by specific types of jobs. The 11 temperaments identified by the U. S. Employment Service for use in job analysis are:

D - *DIRECTING*, controlling, and/or planning activities of others.

R - Performing *REPETITIVE* and/or short-cycle work.

I - *INFLUENCING* people in their opinions, attitudes, and judgments.

V - Performing a *VARIETY* of duties.

E - *EXPRESSING* personal feelings.

A - Working *ALONE* or apart in physical isolation from others.

S - Performing effectively under *STRESS*.

T - Attaining precise set limits, *TOLERANCES*, and standards.

U - Working *UNDER* specific instructions.

P - Dealing with *PEOPLE*.

J - Making *JUDGMENTS* and decisions.

Temperaments became one of the components of job analysis because it was found that different job situations called for different personality traits on the part of the worker. Experience in placing individuals in jobs indicates that the degree to which the worker can adapt to work situations is often a determining factor for success. A person's dissatisfaction or failure to perform adequately can sometimes be attributed to an inability to adapt to a work situation rather than to an inability to learn and carry out job duties.

In the 1950's, the USES recognized a need for expressing temperaments not only in terms of personality characteristics for counseling, but also in terms of work characteristics for purposes of analyzing jobs. A committee was formed to develop a system of USES job analysis components, including revised temperament factors that were relevant to job requirements. As a result, temperaments were reformulated into 12 factors, based on a study in which jobs were evaluated for temperament requirements.[1] Two of these 12 factors, A and U, were subsequently deleted in the 1972 edition of the *Handbook for Analyzing Jobs*, but are now restored as a result of a nationwide survey of job analysts. Based on this same survey, temperaments J and M have been combined into a single decision-making temperament (J), which includes the making of judgments, based on both subjective and objective criteria; analysts found it difficult to differentiate between the two and the distinction (kinds of criteria) not meaningful for analyzing jobs. As a result, there are now the 11 temperament factors listed at the beginning of this chapter. The letter designation of former temperament F has been changed to E because of a title revision; the concept of the factor remains the same.

Unlike aptitudes and interests, there is currently no known validated instrument for measuring whether individuals possess the specific temperaments used by the United States Employment Service, and for this reason the temperament factors are not recommended for use in job or training selection. They do, however, provide an informative job dimension and are useful for identifying job relationships, restructuring jobs, and providing career information.

Estimating Temperament Requirements of Jobs

Evaluate the work activities of the job for applicability of the temperament factors, referring to the definitions of the factors. Select those factors considered to be important in relation to the kinds of adjustments which the worker must make for successful job performance. Do not assign temperaments based solely on incidental work activities. Some simple jobs may require the worker to adjust to only one temperament factor while other jobs may require adjustment to several.

Definitions and Examples of the Temperaments

The 11 temperaments are defined below. Following each definition are examples of worker activities which illustrate the temperament.

D - **DIRECTING, Controlling, and/or Planning Activities of Others:** Involves accepting responsibility for formulating plans, designs, practices, policies, methods, regulations, and procedures for operations or projects; negotiating with individuals or groups for agreements or contracts; and supervising subordinate workers to implement plans and control activities.

---

[1] Boling, Jewell, and Fine, Sidney, "Cues Used by Raters in the Rating of Temperament Requirements of Jobs," *Journal of Applied Psychology*, 1959, 43, pp., 102-108.

- Examples:

Teaches elementary school pupils academic, social, and manipulative skills.

Plans, implements, and coordinates program to reduce or eliminate occupational injuries, illnesses, deaths, and financial losses.

Commands ship to transport passengers, freight, and other cargo across oceans and coastal waters, coordinating activities of crewmembers.

Conducts prosecution in court proceedings on behalf of city, county, State, or Federal Government.

Supervises and coordinates activities of personnel engaged in operation of air-traffic control tower.

R - **Performing REPETITIVE and/or Short-Cycle Work:** Involves performing a few routine and uninvolved tasks over and over again according to set procedures, sequence, or pace with little opportunity for diversion or interruption. Interaction with people is included when it is routine, continual, or prescribed.

- Examples:

Addresses envelopes, cards, and similar items for mailing, by hand or using typewriter.

Feeds flat strips of hoop steel, in which rivet holes have been punched, into rolls of machine to form barrel hoops.

Packs layer of crushed ice on fresh food products packed in barrels, boxes, or crates, to refrigerate them during shipment.

Loads and unloads materials from trucks at shipping and receiving platform.

Sorts incoming or outgoing mail into mail-rack pigeonholes or into mail sacks, according to destination.

I - **INFLUENCING People in their Opinions, Attitudes, and Judgments:** Involves writing, demonstrating, or speaking to persuade and motivate people to change their attitudes or opinions; participate in a particular activity; or purchase a specific commodity or service.

- Examples:

Writes advertising copy for use by publication or for broadcast to promote sales of goods or services.

Persuades producers and announcers of radio and television musical shows to broadcast recordings produced by record manufacturer.

Introduces new fashions and coordinates promotional activities, such as fashion shows, to induce consumer acceptance.

Demonstrates products to customers to promote sales, displaying product and explaining features to customers.

Conducts safety meeting to acquaint plant personnel with potential hazards and need to comply with all safety regulations.

V - **Performing a VARIETY of Duties:** Involves frequent changes of tasks involving different aptitudes, technologies, techniques, procedures, working conditions, physical demands, or degrees of attentiveness without loss of efficiency or composure. The involvement of the worker in two or more work fields may be a clue that this temperament is required.

- Examples:

Schedules appointments, gives information to callers, takes dictation, and otherwise relieves officials of clerical work and minor administrative and business details.

Consults with management; observes jobs; interviews workers; compiles and analyzes occupational data; compiles reports; and transmits occupational information to facilitate personnel, administrative, and management functions of organization.

Assists physician in formulation of prescription for prosthesis; examines and evaluates patient's prosthetic needs; formulates design of prosthesis; selects material; makes casts, measurements, and model modifications; performs fitting; evaluates prosthesis on patient; instructs patient in use of prosthesis; and maintains patient records.

Plans itinerary for hunting and fishing trips; arranges for transporting individuals, equipment, and supplies; explains hunting and fishing laws; prepares meals; and provides first aid to injured.

Accommodates hotel patrons by registering and assigning guests to rooms; issuing room keys and escort instructions to bellhop; date-stamping, sorting, and racking mail; transmitting and receiving messages, using telephone; answering inquiries pertaining to hotel services and local shopping and dining facilities; keeping records of room availability and guests' accounts; computing bills; and collecting payments.

E - **EXPRESSING Personal Feelings:** Involves creativity and self expression in interpreting feelings, ideas, or facts in terms of a personal viewpoint; treating a subject imaginatively rather than literally; reflecting original ideas or feelings in writing, painting, composing, sculpting, decorating, or inventing; or interpreting works of others by arranging, conducting, playing musical instruments, choreographing, acting, directing, critiquing, or editorializing.

- Examples:

Writes humorous material for publication or performance, selecting topic according to personal preference.

Paints variety of original subject material, conceiving and developing ideas for painting.

Creates and teaches original dances for ballet, musical, or revue.

Writes syndicated column on topics of reader interest to stimulate or mold public opinion.

Designs and sculpts three-dimensional artwork.

A - **Working ALONE or Apart in Physical Isolation from Others:** Involves working in an environment that regularly precludes face-to-face interpersonal relationships for extended periods of time due to physical barriers or distances involved.

- Examples:

Locates and reports forest fires and weather phenomena from remote fire-lookout station; reports findings to base camp by radio or telephone.

Works below surface of water, using scuba gear or in diving suit with air line extending to surface.

Explores likely regions to discover valuable mineral deposits, using topographical maps, surveys, reports, and knowledge of geology and mineralogy. Stakes claim according to Federal or State legal requirements.

Traps animals for pelts, live sale, bounty, or to relocate them to other areas. Sets traps, patrols trapline to remove catch, and resets or relocates traps.

Drives gasoline- or diesel-powered tractor-trailer combination long distances, to transport and deliver products.

S - **Performing Effectively Under STRESS:** Involves coping with circumstances dangerous to the worker or others.

- Examples:

Controls and extinguishes fires to protect life and property; positions and climbs ladder to gain access to upper level of buildings or to assist individuals from burning building.

Patrols assigned beat on foot, using motorcycle or patrol car, or on horseback to control traffic, prevent crime or disturbance of peace, and arrest violators.

Performs surgery to correct deformities, repair injuries, prevent diseases, and improve function in patients, using a variety of surgical instruments and employing established surgical techniques.

Controls air traffic on and within vicinity of airport to prevent collisions; alerts support emergency crew and other designated personnel by radio or telephone when airplanes are having flight difficulties.

Repairs and replaces transmission and distribution powerlines between generating stations, requiring use of precautionary work methods and safety equipment due to electrical hazards present when working on or near energized conduction and electrical accessories.

Pilots new, prototype, experimental, modified, and production aircraft to determine its airworthiness; puts aircraft through maneuvers, such as stalls, dives, glides, and speed runs to test and evaluate stability, control characteristics, and aerodynamic design.

T - **Attaining Precise Set Limits, TOLERANCES, and Standards:** Involves adhering to and achieving exact levels of performance, using precision measuring instruments, tools, and machines to attain precise dimensions; preparing exact verbal and numerical records; and complying with precise instruments and specifications for materials, methods, procedures, and techniques to attain specified standards.

- Examples:

Weighs, measures, and mixes drugs and other medicinal compounds, and fills bottles or capsules with correct quantity and composition of preparation, following prescriptions issued by physician or dentist.

Sets up and operates engine lathes to perform machining operations on metal or nonmetallic workpieces according to specifications, tooling instructions, standard charts, and knowledge of machinery procedures.

Moves precisely in combination with other dancers, and coordinates body movements with music, to perform chorus dances.

Establishes position of airplane by use of navigation instruments and charts, celestial observation, or dead reckoning.

Examines parachute and lines to detect deviations from specifications and flaws in materials and workmanship, using glass-topped table or fluorescent light, and marks defective areas.

U - **Working UNDER Specific Instructions:** Involves continuously following instructions in oral, written, or diagrammatic form, which precludes independent action or judgment in working out job problems.

- Examples:

Installs plastic molding strips into slotted edges of metal tabletops, using mallet and bandsaw.

Mixes pharmaceuticals, issues medicines, labels and stores supplies, and cleans equipment and work areas, under direction of licensed, professional worker in hospital pharmacy.

Weighs or measures, grinds, chops, and mixes specified quantities of ingredients to prepare animal food.

Inspects materials and products for conformance to specifications, using fixed or preset measuring instruments.

Bends and adjusts plastic or metal eyeglass frames according to prescription specifications, using jewelers' handtools.

P - **Dealing with PEOPLE:** Involves interpersonal relationships in job situations beyond receiving work instructions.

- Examples:

Counsels parolees having difficulty in readjusting to the community following release from prison.

Consults medical, nursing, and social service staffs concerning problems affecting patients' food habits and needs in order to formulate therapeutic diet menus compatible with each condition and treatment sequence.

Guides hunters and fishers to game areas, explains hunting and fishing laws, and recommends suitable firearms or fishing tackle to take specific game or fish.

Interviews job applicants to select persons meeting employee qualifications and informs applicants about job duties.

Receives callers at establishment, determines nature of business, and directs callers to destination.

J - **Making JUDGMENTS and Decisions:** Involves solving problems, making evaluations, or reaching conclusions based on subjective or objective criteria, such as the five senses, knowledge, past experiences, or quantifiable or factual data.

- Examples:

Examines paintings for color values, style of brushstroke, and esthetic qualities, to establish art period or to identify artist.

Tests and inspects products at various stages of production process and compiles and evaluates statistical data to determine and maintain quality and reliability of products.

Plans layout of newspaper edition, determining placement of stories based on relative significance, available space, and knowledge of layout principles.

Evaluates individual applications for insurance for degree of risk involved and accepts applications, following company's underwriting policies.

Examines food samples to determine sales appeal in restaurants; tastes prepared dishes to ascertain palatability and customer appeal.

Appraises real property to determine value for purchase, sales, investment, mortgage, or loan purposes, considering location and trends or impending changes that could influence future value of property.

Examines and measures industrial diamonds to determine their quality, shape, and size, using classification standards and gages.

CHAPTER 14

PHYSICAL DEMANDS

Page

Estimating Physical Demands Requirements of Jobs 331

Definitions and Examples of the Five Degrees of Strenuousness 332

Definitions and Examples of the Physical Demands Factors 336

1. Standing 336
2. Walking 336
3. Sitting 336
4. Reclining 337
5. Lifting 337
6. Carrying 338
7. Pushing 338
8. Pulling 338
9. Climbing 339
10. Balancing 339
11. Stooping 340
12. Kneeling 340
13. Crouching 340
14. Crawling 341
15. Reaching 341
16. Handling 341
17. Fingering 342
18. Feeling 342
19. Talking 342
20. Hearing 343
21. Tasting/Smelling 343
22. Near Vision 344
23. Midrange Vision 344
24. Far Vision 344
25. Depth Perception 344
26. Visual Accommodation 345
27. Color Vision 345
28. Field of Vision 346

CHAPTER 14

PHYSICAL DEMANDS

Physical demands are the physical capacities required of the worker to perform assigned tasks. The following are the five Degrees of Strenuousness Ratings and the 28 Physical Demands factors used by the United States Employment Service in job analysis:

S - Sedentary Work

L - Light Work

M - Medium Work

H - Heavy Work

VH- Very Heavy Work

1. Standing
2. Walking
3. Sitting
4. Reclining
5. Lifting
6. Carrying
7. Pushing
8. Pulling
9. Climbing
10. Balancing
11. Stooping
12. Kneeling
13. Crouching
14. Crawling
15. Reaching
16. Handling
17. Fingering
18. Feeling
19. Talking
20. Hearing
21. Tasting/Smelling
22. Near Vision
23. Midrange Vision
24. Far Vision
25. Depth Perception
26. Visual Accommodation
27. Color Vision
28. Field of Vision

Estimating Physical Demands Requirements of Jobs[1]

Estimate the importance of each Physical Demands factor to the job. Rate a factor "Important" if it meets at least one of the following criteria:

---

[1] Analysts using this component may find the Physical Demands page of the Job Analysis Report used by the U. S. Employment Service to be helpful. See p. 384.

- It is essential to the successful performance of one or more major or critical tasks of the job.

- It is of an intense, precise, or continuous nature.

- It affects the safety of the worker or others.

Also consider the frequency of each factor, which may have a bearing on importance. A scale can be used, such as the one used by the U. S. Employment Service:

Not Present

Occasional (under 20 percent of the time)

Frequent (between 20 percent and 80 percent of the time)

Constant (over 80 percent of the time)

The intensity of certain strength-related factors, such as lifting, carrying, pushing, and pulling, should be evaluated and described not only in terms of frequency but also in terms of weights, force, distance, and/or duration (intermittent or continuous). Other factors which affect the strenuousness of a job and for which frequency and duration are important considerations are those covering body positions and locomotion activities, such as standing, walking, sitting, reclining, stooping, kneeling, climbing, crouching, and crawling.

Care must be exercised in evaluating the force and physical effort a worker must exert. For instance, if the worker is in an awkward position while crouching, it may be much more difficult to push an object than if pushed at waist height. Also, if the worker is required to continuously lift and carry or push and pull objects over long distances, the worker may exert as much physical effort as required to similarly move objects twice as heavy, but less frequently and/or over shorter distances.

Read the definitions of the factors and the examples that follow the definitions, and compare them with the physical demands data on the job analyzed. Apply the criteria outlined earlier to determine the importance of each factor. Assign the most appropriate Degree of Strenuousness Rating for the job based on the degree to which the factors conform to the definitions of Sedentary, Light, Medium, Heavy, and Very Heavy Work.

Definitions of the Five Degrees of Strenuousness

S - **Sedentary Work:** Lifting 10 pounds maximum and occasionally lifting or carrying articles, such as dockets, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and all other sedentary criteria are met.

- Examples:

  Takes dictation and transcribes from notebook, using typewriter, while sitting at desk. Occasionally walks to various parts of department, when called upon to take dictation.

  Repairs defects in hosiery, using needle, thread, scissors, and mending cup, while sitting at bench.

  Examines watch jewels for defects, using microscope, while sitting at glass table.

  Writes news stories for publication or broadcast, from written notes supplied by reporting staff, while sitting at desk. Occasionally walks to reference library to obtain supplemental material.

  Drafts detailed drawings, while sitting at drawing board. Occasionally walks to obtain items of negligible weight, such as paper, T-square, and other drafting supplies.

  Telephones dealers to determine availability of type and model of automobile desired by customer and prepares papers for transfer of automobiles, while sitting at desk.

  Dispatches taxicabs in response to telephone requests for service, while sitting at desk.

L - **Light Work:** Lifting 20 pounds maximum and/or frequently lifting or carrying objects weighing up to 10 pounds. Even though the weight lifted may be only a negligible amount, a job will be in this category (1) when it requires walking or standing to a significant degree or (2) when it requires sitting most of the time but entails pushing and pulling of arm or leg controls.

- Examples:

  Starts, stops, and controls speed of sewing machine, using pedal or knee lever, while sitting at table.

  Pulls control lever of arbor press downward, exerting about five pounds of force to fit metal parts together, while sitting at bench.

  Arranges records in file cabinets, drawers, and boxes. Walks to obtain records and stands while arranging them.

Wraps and bags articles for customers, standing and walking behind counter of variety store.

Sets up and operates machine that cuts grooves in wooden parts, while constantly standing and continuously lifting, pulling, pushing, and carrying lumber weighing 1 to 5 pounds. Occasionally lifts as much as 15 to 20 pounds of lumber when feeding large pieces into machine.

Lifts cans, jars, or bottles from cardboard carton and places on conveyor. Removes filled or capped containers, which weigh approximately 2 to 3 pounds, from one conveyor and places on another.

Serves food and refreshments to patrons in railroad car, walking from car to kitchen to obtain and relay orders and carrying food trays weighing up to 10 pounds.

M - **Medium Work:** Lifting 50 pounds maximum and/or frequently lifting or carrying objects weighing up to 25 pounds.

- Examples:

Locates and moves materials and parts between work areas of plant to expedite processing of foods, lifting material usually weighing 15-25 pounds and occasionally weighing up to 50 pounds to place in car or handtruck.

Fastens metal objects to plating racks, carries filled racks weighing up to 25 pounds to cleaning, plating, and rinsing tanks, and immerses them in tanks.

Fabricates sheet metal articles, occasionally carrying tools and sheet metal weighing 50 pounds maximum to workbench. Lifts sheet metal to workbench and machine and pushes and pulls it into proper position.

Carries lumber weighing up to 50 pounds from supply room to workbench, a distance of approximately 20 feet. Stands and bends most of time, to lift lumber and pushes and pulls lumber to position on workbench or machine.

Lifts, pushes, and pulls to jack up automobile, to remove tire from wheel, and to remount tire. Rolls tires, usually weighing aproximately 25 pounds and occasionally weighing more than 50 pounds, to repair work area.

Dismantles, tests, adjusts, repairs, and installs engine parts of aircraft, walking and standing continuously. Lifts and carries parts weighing up to 25 pounds for inspection and repair, and pushes and pulls components into position on workbench.

H - **Heavy Work:** Lifting 100 pounds maximum and/or frequently lifting or carrying objects weighing up to 50 pounds.

- Examples:

Digs trench to specified depth and width, constantly pushing shovel into earth and lifting, carrying, and throwing shovelsful of earth onto pile. Shovel often is raised to shoulder height and weight lifted is concentrated at its end. Shovel and earth weigh approximately 20 pounds, but the continuous effort involved requires strength comparable to that required by frequent lifting up to 50 pounds and occasional lifting up to 100 pounds.

Charges furnaces, lifting and carrying metal weighing 35 to 50 pounds. Frequently pushes and pulls from awkward crouching position to turn metal in furnace with tongs. Periodically withdraws metal from furnace and carries it, with assistance, to forge.

Fits pipe assemblies into place, frequently lifting and carrying pipe and pipe connections weighing 50 pounds and occasionally up to 100 pounds, with aid of helpers. Stands, stoops, and crouches while reaching above and below shoulder height to pull pipes into position.

Mixes pastry, standing almost continuously. Occasionally lifts and carries 100-pound bags of flour about 20 feet from stack to mixing bowl. Frequently turns and stoops to lift bags of sugar and shortening, each weighing 50 pounds.

Pushes handtruck up and down warehouse aisles, lifts cartons of items weighing an average of 65 pounds from storage shelves, and places cartons on handtruck to fill orders. Lifts cartons from handtruck in order to complete packing, wrapping, sealing, and labeling for shipping. Lifts and carries cartons to skids for shipping.

VH - **Very Heavy Work:** Lifting objects in excess of 100 pounds and/or frequently lifting or carrying objects weighing 50 pounds or more.

- Examples:

Lifts lumber and other material weighing 50 pounds or more and carries to handtruck.

Transfers adult patients between bed and conveyance, frequently lifting them without assistance, and pushes wheelchair or wheeled stretcher to transport patients to hospital areas.

Loads and unloads truck when transporting or delivering articles, such as furniture, refrigerators, and machinery, many of which weigh in excess of 100 pounds.

Loads and unloads trailers and semi-trailers with crates of produce weighing from 80 to 110 pounds.

Performs machine and hand operations necessary to fabricate and assemble boilers, tanks, vats, and other vessels made of heavy steel plates weighing up to 120 pounds.

Installs ship's steam, diesel, or electric propelling and auxiliary machinery and equipment, such as pumps, cargo-handling machinery, anchor-handling gear, ventilating and firefighting equipment, steering gear, and armament.

Definitions and Examples of the Physical Demands Factors

1. **Standing:** Remaining on one's feet in an upright position at a work station without moving about. Describe in terms of duration.

   - Examples:

   Directs movement of traffic through construction site from a stationary post, using sign, hand, and flag signals.

   Cuts patrons' hair, while standing at barber chair.

   Cuts and trims meat for display, while standing at chopping block.

   Poses for artist, while standing in one position for long time.

   Presses garments on ironing board, using hand iron.

2. **Walking:** Moving about on foot. Includes running. Describe in terms of duration and distance.

   - Examples:

   Patrols assigned area on foot.

   Periodically patrols area, while guarding industrial property against fire, theft, vandalism, and illegal entry.

   Walks from parking meter to parking meter to collect coins or coin boxes.

   Walks through new buildings to check construction.

3. **Sitting:** Remaining in the normal seated position. Describe in terms of duration.

- Examples:

Sits while driving tractor-trailer truck for long distances.

Sits at desk while posting records of financial activities of business firm.

Sits for long periods of time to interview people and gather information.

Types while seated at desk.

Sits while taking accurate notes of happenings in courtroom for official records.

4. **Reclining:** Lying on one's side or in a prone or supine position. Describe in terms of position and duration.

- Examples:

Digs in prone position in narrow passageways to unearth archeological specimens.

Repairs automobiles in supine position beneath car.

Repairs pipes underneath houses while lying on side or in supine position.

Bolts machine to factory foundation while in prone position.

Rivets, bolts, and repairs inside of boiler, lying in sideways, supine, and prone positions.

5. **Lifting:** Raising or lowering an object from one level to another, using hands, arms, and/or shoulders. Includes upward pulling. Describe in terms of weights and vertical distances.

- Examples:

Lifts up to 20 pounds of dust-collecting equipment used to collect samples of air in industrial plants.

Lifts up to 50 pounds of parts, tools, and equipment used to service and repair airplane engines.

Lifts cans of paint and ladders.

Lifts and positions patients on treatment table and during transfer to wheelchair.

Lifts cartons containing bottles or cans of beer and places on cart to deliver to stores.

6. **Carrying:** Moving an object, usually by holding it in hands or arms, or on shoulders. Describe in terms of weights, distances, and duration.

   - Examples:

     Carries groceries in bag or carton from supermarket check-out counter to customer's car.

     Carries animals between cages, laboratories, and operating rooms, and carries large sacks of food to kitchen when preparing animal food.

     Carries and distributes bakery supplies, such as flour, shortening, and baking pans, to bakers.

     Delivers telephone directories to residences and business establishments, on foot.

     Carries requested library material between shelving area and issuing desk.

7. **Pushing:** Exerting force upon an object so that the object moves away from the force. Includes slapping, striking, kicking, and treadle actions. Describe in terms of weights, estimated force, distances, duration, and/or type of surface (e.g., smooth, inclined, etc.)

   - Examples:

     Pushes cart of fish from wharf to fish-cleaning table.

     Transports patients to hospital areas, such as operating and X-ray rooms, by pushing bed, wheelchair, or wheeled stretcher.

     Frequently depresses treadle to stop, start, and control speed of sewing machine.

     Exerts up to 50 pounds of force to tilt and roll drums of chemicals.

     Pedals three-wheeled vehicle to transport passengers in amusement park.

8. **Pulling:** Exerting force upon an object so that the object moves toward the force. Includes jerking. Describe in terms of weights, estimated force, distances, duration, and/or type of surface (e.g., smooth, inclined, etc.)

   - Examples:

     Pulls pallet jack laden with palletized glassware cartons up slight incline, exerting estimated force of 100 pounds.

     Pulls overhead chain hoist to lift reels of wire when mounting wire onto machine cradle.

Exerts estimated 50 to 75 pounds of force to pull bags of ingredients from storage area to mixing machine.

Pulls tiered rack trucks, applying about 35 pounds of force to move bakery products around production area.

Exerts force of approximately 10 pounds to pull stretcher-drier frame out of steam cabinet.

9. **Climbing:** Ascending or descending ladders, stairs, scaffolding, ramps, poles, and the like, using feet and legs and/or hands and arms. Body agility is emphasized. Describe in terms of height, steepness, duration, and type of structure climbed.

- Examples:

Climbs ladder to attach advertising posters on elevated billboards.

Ascends poles to install, maintain, and repair telephone, telegraph, and electrical powerlines.

Climbs fire escapes and ladders to gain access to upper levels of buildings or to assist individuals from burning structures.

Climbs trees to reach and trim branches interfering with transmission wires.

Climbs ladder to plaster ceilings.

10. **Balancing:** Maintaining body equilibrium to prevent falling when walking, standing, crouching, or running on narrow, slippery, or erratically moving surfaces; or maintaining body equilibrium when performing gymnastic feats. Describe in terms of type or condition of surface and activities during which balance must be maintained.

- Examples:

Balances to avoid falling or spilling food when serving passengers on airplane in flight.

Balances on slippery, erratically moving, floating barrier (boom) of logs while sorting logs according to species, size, and owners' markings.

Maintains equilibrium while dancing and performing difficult gymnastic feats.

Balances on narrow steel girders of building under construction, while catching hot rivets tossed by Rivet Heater in bucket and inserting rivets in holes, using tongs.

Balances on scaffolding when installing glass on upper stories of building front.

11. **Stooping:** Bending body downward and forward by bending spine at the waist. Describe in terms of duration.

- Examples:

  Stoops between plant rows to reach for and pull, twist, or cut harvestable crop.

  Stoops while shoveling snow into truck.

  Stoops while cleaning, waxing, and polishing floors, using waxing machine.

  Stoops to gather worms in grassy areas for use as fish bait.

  Stoops to refinish bodies of automobiles, to remove and replace damaged fenders, and to straighten and realine automobile frames.

12. **Kneeling:** Bending legs at knees to come to rest on knee or knees. Describe in terms of duration.

- Examples:

  Kneels while pressing carpet firmly in place over tackless strips, using handtools.

  Operates concrete-wall grinder to remove bumps and rough spots from exposed concrete surface, working in kneeling position for sustained periods.

  Kneels to connect wiring to fixtures and power equipment located in cramped places.

  Kneels while examining rocks, minerals, and fossils to identify and determine sequence of processes affecting development of earth.

  Kneels to adjust and repair electrically powered, automatic pinsetting bowling machines.

13. **Crouching:** Bending body downward and forward by bending legs and spine. Describe in terms of duration.

- Examples:

  Crouches over rows of rose plants to reach and cut plant rootstock.

  Crouches to secure post and attach lead-in wire to antenna.

  Crouches to spread mortar and position bricks on lower parts of walls.

  Crouches to remove catch from and reset traps.

  Crouches when filing correspondence in lower drawers of filing cabinets.

14. **Crawling:** Moving about on hands and knees or hands and feet. Describe in terms of distance and duration.

- Examples:

Crawls underneath building to remove debris prior to spraying insecticide.

Crawls while smoothing and finishing surface of poured concrete sidewalks, using straightedge.

Crawls while cleaning, waxing, and polishing floors, using rags and brushes.

Crawls through narrow spaces to reach all parts of furnace when cleaning or repairing furnace.

Crawls into low attics and under buildings to inspect buildings for presence of vermin.

15. **Reaching:** Extending hand(s) and arm(s) in any direction.

- Examples:

Reaches for ledgers, tax tables, and writing instruments.

Reaches for drawings, chemically treated paper, and controls on machine to make blueprints.

Reaches for individual wires and winds them around pegs on harness board.

Reaches for knives, tubes, and other equipment while preparing body for burial.

Reaches for high branches to pick fruit.

16. **Handling:** Seizing, holding, grasping, turning, or otherwise working with hand or hands. Fingers are involved only to the extent that they are an extension of the hand, such as to turn a switch or shift automobile gears.

- Examples:

Handles tools, parts, and test instruments used to service and repair aircraft engines.

Grasps handtools and powered handtools when fitting and fastening automobile and truck components.

Handles and grasps combs, scissors, razors, and lotions while providing barbering services.

Uses arms and hands to turn steering wheel, operate gearshift, and handle baggage.

Holds parts and handles tools and lumber when building and repairing wooden articles.

17. **Fingering:** Picking, pinching, or otherwise working primarily with fingers rather than with the whole hand or arm as in handling.

- Examples:

Fingers keys accurately when using adding and calculating machines.

Uses fingers constantly to count and sort coins and paper money and operate keys on cash register.

Squeezes and stretches sample of curd with fingers to determine firmness or texture of cheese.

Uses fingers to cut, pin, and sew sample garments.

Picks up and places rivets into holes of metal cabinets.

Positions pinion in machine holder, using tweezers.

18. **Feeling:** Perceiving attributes of objects, such as size, shape, temperature, or texture, by touching with skin, particularly that of fingertips.

- Examples:

Slides fingers over braille characters to feel discrepancies in proof.

Strokes fur to feel density of pelts in order to select pelts that have same thickness and length of fur.

Feels upholstery padding to determine conformance to specified degree of firmness.

Feels dough in dough-mixing machine for desired consistency before ending mixing cycle.

Feels poultry for presence of bruises, deformities, and pinfeathers, and grades accordingly for quality.

19. **Talking:** Expressing or exchanging ideas by means of the spoken word. Talking is important for those activities in which workers must impart oral information to clients or to the public, and in those activities in which they must convey detailed or important spoken instructions to other workers accurately, loudly, or quickly.

- Examples:

  Speaks clearly and distinctly to instruct pilots.

  Exhorts passing public to attend show.

  Speaks in pleasant, well-controlled voice to present radio and television programs to audience.

  Answers inquiries regarding departures, arrivals, stops, and destinations of scheduled buses or trains.

  Orally interprets specifications, blueprints, and job orders to workers.

20. **Hearing:** Perceiving the nature of sounds. Hearing is important for those activities which require ability to receive detailed information through oral communication, and to make fine discriminations in sounds, such as when making fine adjustments on running engines.

    - Examples:

      Test-drives vehicle and listens for rattles, squeaks, or other noises reported by customer, indicating malfunctioning or loose components.

      Listens intently to sounds of safe locks while turning dial to open safe.

      Listens attentively to take dictation and answer telephone.

      Listens to sounds of running engine to detect possible faulty operation.

21. **Tasting/Smelling:** Distinguishing, with a degree of accuracy, differences or similarities in intensity or quality of flavors and/or odors, or recognizing particular flavors and/or odors, using tongue and/or nose.

    - Examples:

      Tastes and smells food being cooked to determine if it is cooked sufficiently.

      Determines, by smell, odor qualities of prepared materials used in the production of perfume.

      Tastes samples of food or beverages to determine palatability of product or to prepare blending formulas.

      Tastes baked pretzels and adjusts speed of conveyor or temperature of cooler, oven, or kiln to insure pretzels conform to taste standards.

      Walks along pipelines to detect gas odor indicating leaks and notifies maintenance department of location of leaks.

22. **Near Vision:** Clarity of vision at 20 inches or less.

- Examples:

  Legibly enters numerical data in bookkeeping ledgers.

  Sketches and paints, in minute detail, illustrations of anatomical and pathological specimens.

  Continuously reads, compiles, computes, and records numerical and statistical data.

  Guides material under needle and continuously checks alinement and accuracy of stitching.

  Examines components for scratches, chips, and other defects, using magnifier.

23. **Midrange Vision:** Clarity of vision at distances of more than 20 inches and less than 20 feet.

- Examples:

  Observes customer's appearance while cutting hair, beard, and mustache.

  Selects various liquors and measures correct amounts when mixing drinks.

  Positions bricks, removes excess mortar, and checks alinement of bricks.

  Reads incoming documents and separates according to file system.

  Reads addresses on letters and packages and arranges them in geographical order to be delivered.

24. **Far Vision:** Clarity of vision at 20 feet or more.

- Examples:

  Watches for landmarks when taking off and landing airplane.

  Reads traffic signs at distances up to 200 feet while driving taxi.

  Identifies machine jams at distances of 20 to 35 feet.

  Locates and reports forest fires by viewing from remote fire-lookout station.

25. **Depth Perception:** Three-dimensional vision. Ability to judge distances and spatial relationships so as to see objects where and as they actually are.

- Examples:

Observes farm machinery in operation to detect malfunctioning or defective units.

Judges distances and space relationships of stationary and moving objects to avoid accidents while driving bus.

Dismantles and reassembles engines, using handtools.

Operates power derrick to load and unload loose materials from railroad cars, moving controls to raise, lower, and rotate boom and to raise and lower load line in response to signals.

Observes products moving on conveyors to monitor flow and operation of automated conveyor system.

26. **Visual Accommodation:** Adjustment of lens of eye to bring an object into sharp focus. Especially important when doing near point work at varying distances from eye.

- Examples:

Guides electric cutter through layers of fabric, continually keeping cutting lines in sharp visual focus.

Shifts gaze from viewing screen several feet distant to compare with data on correspondence and forms at near distance.

Inspects and adjusts minute parts, using unaided vision as well as magnifiers and precision gages.

Reads typescript or proof of type setup to detect and mark for correction.

Examines tissue samples under microscope for atypical characteristics and records findings on data sheet.

27. **Color Vision:** Ability to identify and distinguish colors.

- Examples:

Performs pH titration test to ascertain if material is within specified limits, requiring ability to observe subtle color changes.

Makes discriminating comparison of color hue and color brightness in lipsticks.

Identifies resistors by color code and connects colored wires to specific terminals.

Assists customers in color coordinating selection of wallcoverings.

Mixes inks to obtain proper color and shade, comparing results with sample.

28. **Field of Vision:** Observing an area that can be seen up and down or to right or left while eyes are fixed on a given point.

- Examples:

Rides racehorse at racetrack, relying on peripheral vision to observe relative positions of nearby horses during race.

Monitors control-board panels and TV monitors from desk and notifies supervisor when machine maintenance is required.

Observes actions of participants of sporting event to detect infractions of rules.

Drives taxicab in city traffic.

Observes racing cars passing start-finish line of track to obtain count of laps completed by each competitor.

Physical Demands, as a component of job analysis, is extremely useful for the counseling and placement of the handicapped. The USES method of job analysis involves describing and evaluating the physical-demands requirements of a job as that job exists at the time of the analysis to permit the matching of workers having the necessary capabilities. However, these requirements can often be modified for certain groups of disabled workers through such actions as job restructuring, alteration of physical plant layout, and adaption of special or different work devices. The extent to which a given job is potentially suitable for the handicapped is an area that an analyst may wish to pursue as a special application of job analysis.

CHAPTER 15

ENVIRONMENTAL CONDITONS

Page

Rating Environmental Conditions 349

Definitions and Examples of the Environmental Conditions Factors 350
- 1. Exposure to Weather 350
- 2. Extreme Cold 350
- 3. Extreme Heat 351
- 4. Wet and/or Humid 351
- 5. Noise 352
- 6. Vibration 352
- 7. Atmospheric Conditions 353
- — Inherent Hazards: 353
- 8. Proximity to Moving, Mechanical Parts
- 9. Exposure to Electric Shock
- 10. Working in High, Exposed Places
- 11. Exposure to Radiant Energy
- 12. Working with Explosives
- 13. Exposure to Toxic or Caustic Chemicals
- 14. Other Hazards Not Listed Elsewhere in This Chapter (Decribe)

CHAPTER 15

ENVIRONMENTAL CONDITIONS

Environmental conditions are the specific physical working conditions to which the worker is exposed while performing assigned tasks. The following are the 14 Environmental Conditions rated by the U. S. Employment Service in job analysis:

1. Exposure to Weather
2. Extreme Cold
3. Extreme Heat
4. Wet and/or Humid
5. Noise
6. Vibration
7. Atmospheric Conditions

Inherent Hazards:

8. Moving, Mechanical Parts
9. Electric Shock
10. High, Exposed Places
11. Radiant Energy
12. Explosives
13. Toxic or Caustic Chemicals
14. Other

Rating Environmental Conditions[1]

Carefully read the definitions of the conditions and the examples that follow the definitions, and compare them with the environmental conditions data on the job analyzed. Rate any of the conditions important to the job if either of the following two criteria are met:

- The worker is exposed to the factor an estimated 20 percent or more of the time.
- The factor is hazardous, in that it may cause bodily injury or danger to life and health.

Conditions 8 - 14, Inherent Hazards, include those working conditions which are usually considered to be hazardous. However, when any hazard has been overcome through use of safety equipment over which the worker has no control, the job is not rated as hazardous.

---

[1] Analysts using this component may find the Environmental Conditions page of the Job Analysis Report used by the U. S. Employment Service to be helpful. See p. 385.

Definitions and Examples of the Environmental Conditions Factors

1. **Exposure to Weather:** Exposure to hot, cold, wet, humid, or windy conditions, caused by the weather, which results in marked bodily discomfort.

- Examples:

Erects and repairs electric-power lines, often in inclement weather, and is exposed to hot, cold, wet, or windy conditions.

Delivers mail to residential areas, often in inclement weather, spending 75 percent of working time outdoors.

Picks field crops, frequently in heat of sun, continuing during periods of light rain. Usually works during growing season, coincident with mild weather.

Diverts actions of school children and traffic at street intersections to insure safe crossing. Guards crossing regardless of weather conditions.

Patrols assigned areas to prevent game law violations, investigates reports of damage to crops and property by wildlife, and gathers biological information. Works outdoors in all kinds of weather and travels by car, boat, airplane, horse, and on foot.

2. **Extreme Cold:** Exposure to nonweather-related temperatures that are sufficiently low to cause marked bodily discomfort.

- Examples:

Stores ice in cold-storage room.

Works in cooler room, usually kept at approximately 40° F., while cutting up beef carcasses into standard cuts.

Stores ice cream in hardening room to solidify and keep ice cream in good condition. Enters and leaves room constantly.

Packs dressed fish in ice. Shovels layer of ice in box and fills body cavity of each fish with ice. Places fish in box and fills remainder of box with ice. Room temperature must be below freezing to prevent ice from melting.

Tends freeze tunnel to quick-freeze food products. Patrols tunnel to observe progress of food product to insure freezing. Scrapes conveyor to remove excess ice or frost.

3. **Extreme Heat:** Exposure to nonweather-related temperatures that are sufficiently high to cause marked bodily discomfort.

- Examples:

Works close to hot stove during cooking operations while performing various activities, such as agitating, testing, and draining cooking mixture.

Charges furnace, turns billets in furnace, and withdraws heated billets.

Works constantly around hot tumblers in laundry room, reaching in and removing articles when partially cooled.

Controls movement of machine that spreads hot asphalt on streets and roads and is subject to intense heat produced by heating mechanism of machine.

Controls furnace to relieve internal stresses in metal objects and to soften and refine grain structure. Places metal objects directly into furnace. Reduces heat and allows objects to cool in furnace.

Tends battery of present final-drying chambers that automatically dry macaroni long goods. Pushes rack of macaroni into drying chambers and starts drying cycle. Removes rack of dried macaroni after completion of drying cycle.

4. **Wet and/or Humid:** Contact with water or other liquids; or exposure to nonweather-related humid conditions where humidity is sufficiently high to cause marked bodily discomfort.

- Examples:

Presses garment, using pressing machine, and is constantly exposed to oppressive humidity resulting from steam emitted by pressing machine and by damp garments which are being ironed.

Feeds food products into washing machine preparatory to cooling and canning. Handles wet food and works in wet area.

Maintains kitchen work area and restaurant equipment and utensils in clean condition. Washes worktables, hoses out garbage cans, and washes pots, pans, trays, and dishes by hand. Hands in constant contact with water.

Dumps containers of fish into fresh water tank for cleaning; removes wet fish from tank and trims off fins and tails, removes skin, and cuts fish into pieces of specified size. Constantly handles wet fish and works in wet area.

Loads damp articles into tumblers and removes hot, dried articles from tumblers, working in humid atmosphere.

5. **Noise:** Exposure to constant or intermittent sounds of a pitch or level sufficient to cause a worker to have difficulty hearing the voice of a person three or four feet away unless voice is raised above normal conversational level. Noise is considered to be hazardous if level and exposure time are sufficient to cause possible hearing loss without protection.

- Examples:

  Operates compressed-air, rock-drilling machine to drill holes through hard material. Exposed to continuous vibration and to noise of approximately 130 decibels.

  Operates frame-spinning machine for spinning thread out of roving. Noise levels in large spinning rooms with many frames in operation at once reach approximately 105 decibels, making conversation impossible, except by shouting.

  Operates offset printing press to print multicolor tags and labels from plate in tag-and-label printing establishment. Noise from presses in operation, estimated at 80 decibels, is sufficient to interfere with normal level of speech.

  Sets up and operates power press that automatically feeds metal into position under ram and punches out metal parts. Operator is exposed to constant noise level of approximately 10 decibels.

  Operates sewing machine to join parts of fabricated garment. Constant noise produced by a number of machines results in a decibel level of approximately 80, making ordinary conversation difficult.

6. **Vibration:** Exposure to a shaking object or surface that causes a strain on the body or extremities.

- Examples:

  Operates compressed-air, rock-drilling machine. Worker is exposed to continuous vibration.

  Operates tractor to scoop up earth. Worker is subject to intense vibration while scraper is forced into ground and while tractor is driven forward to fill scraper with dirt.

  Operates cylinder-type printing press. Worker is subject to continuous vibration when the printing press is in operation.

  Operates drilling equipment to drill holes in walls or slabs of concrete to facilitate installation and repair of utility systems and equipment. Continuous vibration is felt by worker.

Positions metal workpiece in lower die and presses pedal causing ram to strike metal repeatedly forcing it to shape of die impression. Vibration is caused by the repeated striking of the ram against the metal.

7. **Atmospheric Conditions:** Exposure to conditions that affect the respiratory system or the skin, such as fumes, noxious odors, dusts, mists, gases, and poor ventilation.

- Examples:

Pours pigments, paint paste, vehicle, and thinner into can and stirs mixture with paddle, working in metal-finishing plant. Worker constantly breathes fumes and odors of paint ingredients.

Stacks grain by hand or with pitchfork during harvesting and threshing and is exposed to heavy concentration of dust from movement of grain.

Takes care of animals, such as dogs, mice, and monkeys, which are being used for medical tests. Cleans and sterilizes cages, pens, and surrounding areas, such as walls, windows, and floors, using steam or germ-killing solutions. Sprays or spreads insect-killing solutions or powders. Worker is subject to disagreeable odors and skin irritants from solutions.

Repairs and overhauls automobiles. Worker is exposed to fumes and odors of grease, oil, gas, and engine exhaust.

Shampoos hair and scalp with various ingredients and rinses. Applies bleach, dye, or tint to color customer's hair. Worker is exposed to strong odors and skin irritants from various hair preparations and lotions.

— **Inherent Hazards:** Exposure to conditions which may cause bodily injury or danger to life or health, such as:

8. **Proximity to Moving, Mechanical Parts**

9. **Exposure to Electrical Shock**

10. **Working in High, Exposed Places**

11. **Exposure to Radiant Energy**

12. **Working with Explosives**

13. **Exposure to Toxic or Caustic Chemicals**

14. **Other Hazards Not Listed Elsewhere in This Chapter (Describe)**

- Examples:

Prepares, administers, and measures radioactive isotopes in therapeutic, diagnostic, and tracer studies, utilizing variety of radioisotope equipment, and is exposed to hazards of radiation.

Repairs energized electric power lines. Worker is subject to falls when climbing poles and to severe burns or electrocution.

Demolishes parts of buildings to reach and combat fires and rescue persons endangered by fire and smoke. Is exposed to burns, fumes, smoke, and falling objects.

Mines ore or coal in underground mine. Cuts channel under working face to facilitate blasting; charges and sets off explosives to blast down material; and installs timbering to support walls and roof. Exposed to danger of mine collapse, explosion of natural gas, and suffocation.

Patrols assigned beat to prevent crime or disturbance of peace. Worker is liable to bodily injury or death from law violators.

Dives in ocean to depths of up to three hundred feet. Worker is subject to the bends and other conditions associated with high water pressure and oxygen deprivation.

Patrols ski slopes prior to allowing public use. Worker is exposed to avalanche danger.

PART 3

JOB ANALYSIS REPORTS
OF THE
U.S. EMPLOYMENT SERVICE

CHAPTER 16

STAFFING TABLE

Page

Instructions for Preparing the Staffing Table 359

Staffing Table Face Sheet 359

Staffing Table Title Sheet 361

Sample Forms 364

CHAPTER 16

STAFFING TABLE

The Staffing Table (form 349, in two parts) is a systematic arrangement of data on the nature and distribution of jobs and workers within an establishment that aids the analyst in planning a job study and provides information on industry staffing patterns. It consists of a Face Sheet and one or more Title Sheets. The Face Sheet provides for such information as the establishment identification number, the Standard Industrial Classification (SIC) titles and codes, the number of employees, the analyst's name, the date of the study, the types of products manufactured or services rendered, and comments pertinent to the study. The Title Sheet provides for a listing of jobs within organizational units according to establishment titles; the recording of the number of workers employed on each job per work shift; and the conversion of establishment job titles to titles and codes in the *Dictionary of Occupational Titles* (DOT).

Entries on the Staffing Table should be compatible with entries on the Job Analysis Reports (see Chapter 17). In some cases, where it fulfills the objectives of the study, a Staffing Table is limited to specific jobs, departments, or processes.

Instructions for Preparing the Staffing Table

The procedures for preparing the Staffing Table Face and Title Sheets have been developed for use by the United States Employment Service, but can be adapted by other users to meet their particular needs.

Staffing Table Face Sheet

1. **Control No.:** Enter a 13-digit code number as follows: The first four digits correspond to the primary SIC code (e.g., 2812). If a two- or three-digit SIC code applies, enter zeros as the third and/or fourth digits, such as 2810 for SIC code 281, and 2800 for SIC code 28.

   The next three digits represent the Occupational Analysis Field Center (OAFC) or State agency code. For example, for the New York OAFC, enter 352.

   The last six digits represent the serial number assigned to the establishment by the OAFC. For example, for establishment number 150, enter 000150; for establishment number 2500, enter 002500.

2. **Primary SIC Code:** Enter the four-digit SIC code representing the major activity of the establishment. When more than one four-digit code pertains, a two- or three-digit code may be entered instead to summarize them.

3. **Secondary SIC Code:** Enter the four-, three-, or two-digit SIC code representing one or more secondary activities of the establishment. If none, leave blank.

4. **Date:** Enter the date on which the data-gathering phase of the study was completed (e.g., 3/17/79).

5. **Primary SIC Industry Name:** Enter the SIC title of the primary SIC code entered in Item 2. Use the short SIC titles listed in Appendix B of the SIC Manual.

6. **Establishment No.:** Enter the establishment identification number, consisting of the OAFC or State agency code number, the total number of employees, and the serial number assigned the establishment by the OAFC (e.g., 352-1242-1145).

7. **No. of Employees:** Enter the total number of employees in the establishment, regardless of whether or not all departments or jobs are to be analyzed.

8. **Ind. Desig. Code:** Enter the three-digit DOT Industry Code, as listed in Appendix A of the SOC Manual, for the assigned industry.

9. **Name of Analyst:** Enter the name(s) of the analyst(s) who conducted the study.

10. **T/A Code:** Leave blank (for USES computer control).

11. **Industry Designation; Products Manufactured or Services Rendered:** List the abbreviated DOT industry designation in lowercase type, enclosed by parentheses. Record information concerning the type, size, and other distinguishing characteristics of the product(s) or service(s) of the establishment.

12. **Remarks:** Explain briefly the scope or purpose of the study. For example, explain that the study covers all jobs at the establishment, jobs peculiar to a specific industry, or selected jobs. Also include any restrictions, such as time limitations, imposed by establishment officials. Explain briefly factors which may affect the number and kinds of workers employed, such as the installation of automated equipment or changes in methods or procedures. When follow-up visits are made to an establishment, note this fact here and indicate the changes that have occurred since the last visit. Indicate hours of work shifts and their corresponding shift numbers from Title Sheets.

Staffing Table Title Sheet

Page ____ of ____: Enter the consecutive page number and total number of pages, not counting the Face Sheet.

1. **Control No.:** Enter the Control Number appearing in Item 1 of the Face Sheet.
2. **Primary SIC Code:** Enter the SIC Code appearing in Item 2 of the Face Sheet.
3. **Dept. No.:** Enter in this column the sequential number, starting with "1," of the department whose name will appear on the same line in Item 5. Leave blank if a plant job title appears on the same line in Item 5.
4. **Job No.:** Enter a zero in this column if a department name appears on the same line in Item 5. Enter a sequential number in this column, starting with "1," for each establishment job title appearing in Item 5. The first establishment job title in each department will start with the number "1".
5. **Dept. Name/Estab. Job Title:** Enter, in capital letters, the name of the department, unit, section, or other organizational subdivision under which job titles are to be listed; or enter, in initial capital letters, the job title used by the establishment. If more than one title is used by the establishment to identify the same job, enter the most commonly used or most descriptive title. If the establishment title is ambiguous or nondescriptive, enter a meaningful, descriptive title under it in parentheses, (e.g., the establishment job title, "Operator A," might be more descriptive titled, "Turbine Generator Operator"). Job titles listed should match the primary titles indicated on the Job Analysis Reports, if prepared.
6. **Inex:** If a Job Analysis Report has been prepared, enter one of the following numerical symbols to indicate whether experience is required and, if so, its degree of job-relatedness:

   1 - Job requires no work experience of any kind.
   2 - Job requires experience in unrelated job(s).
   3 - Job requires experience in related job(s).
   4 - Job requires experience in same occupation.

— **Shift No./Total Emp.:**

7. - 10. **Shift No. (1-4):** Enter the number of employees by work shift. Hours of work covered by work-shift identification numbers should be explained in the Remarks section of the Face Sheet.

11. **Total:** Enter the total number of employees represented by Item 5.

12. **DOT Title:** Enter, in capital letters, the published base or undefined related DOT title if the establishment job is determined to be essentially similar to an occupation defined in the DOT. Leave blank only if "A," "V," or "NO" is indicated in Item 17.

13. **Indust. Desig.:** Enter the published industry designation(s) of the DOT title appearing in Item 12. Leave blank if Item 12 is blank.

14. **DOT Code:** Enter the published nine-digit DOT code if the establishment job is determined to be essentially similar to an occupation defined in the DOT. Enter the six- or nine-digit code assigned to new jobs (not in the DOT) for which a Job Analysis Report has been prepared. Leave blank only if "NO" is indicated in Item 17.

15. **SOC:** Enter the two-, three-, or four-digit code of the group definition in the *Standard Occupational Classification Manual* that best describes the job. Leave blank only if "NO" is indicated in Item 17.

16. **GOE:** Enter the six-digit code of the occupational subgroup in the *Guide for Occupational Exploration* into which the job best fits. If it is not possible to assign a six-digit GOE code, a four- or two-digit code may be assigned. Leave blank only if "NO" is indicated in Item 17.

17. **TR.:** Enter in this column the appropriate treatment code (A, C, V, O, or NO). The treatment codes are applicable as follows:

    A. The job does not convert to a DOT classification; a complete Job Analysis Report is prepared.

    C. The job converts to a DOT classification; a complete Job Analysis Report is prepared.

    V. The job does not convert to a DOT classification and is similar to a job in another establishment for which a Job Analysis Report has previously been prepared. A complete Job Analysis Report is prepared, and the ID numbers of both Job Analysis Reports are entered in Item 18, Comments.

    O. The job converts to a DOT definition, but no Job Analysis Report is prepared because of employer limitations or because a sufficient number of Job Analysis Reports have already been prepared for that occupation.

    NO. The analyst is unable to obtain sufficient information to assign a DOT code.

18. **J.A. Report No./Comments:** For "A" and "C" treatments, enter the ID number of the Job Analysis Report. For "V" treatments, enter the ID number

of both the previous and the current Job Analysis Reports, as shown in the example on page 367. For "C" treatments in which any of the first six digits of the assigned code differs from the published DOT Code, enter the assigned code in parentheses. For "NO" treatments, enter the reason for no action being taken. If the job studied is from the Core-List, enter "Core-List Occupation." This space may also be used for brief comments about specific jobs.

19. **T/A Code:** Leave blank (for USES computer control).

STAFFING TABLE
FACE SHEET

1. CONTROL NO.

2. PRIMARY SIC CODE

3. SECONDARY SIC CODE

4. DATE MO. DAY YR.

5. PRIMARY SIC INDUSTRY NAME

6. ESTABLISHMENT NO.

7. NO. OF EMPLOYEES

8. IND. DESIG. CODE

9. NAME OF ANALYST

10. T/A CODE

11. INDUSTRY DESIGNATION; PRODUCTS MANUFACTURED OR SERVICES RENDERED

12. REMARKS

Form 349 (Experimental) 9/81

Page ____ of ____

STAFFING TABLE TITLE SHEET									1. CONTROL NO.	2. PRIMARY SIC CODE	TREATMENT CODES FOR COLUMN 17	O - Converted to DOT. No job analysis V - Verification of previously prepared job analysis A - Preparation of complete job analysis C - Converted to DOT. Job analysis prepared		
3. DEPT. NO.	4. JOB NO.	5. DEPT. NAME/ESTAB. JOB TITLE	6. IN-EX	SHIFT NO./TOTAL EMP.					12. DOT TITLE	14. DOT CODE		17. TR.	18. JA REPORT NO./COMMENTS	19. T/A CODE
				7. 1	8. 2	9. 3	10. 4	11. TOTAL	13. INDUST. DESIG.	15. SOC	16. GOE			
3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	14.		17.	18.	19.
									13.	15.	16.			
3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	14.		17.	18.	19.
									13.	15.	16.			
3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	14.		17.	18.	19.
									13.	15.	16.			
3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	14.		17.	18.	19.
									13.	15.	16.			
3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	14.		17.	18.	19.
									13.	15.	16.			
3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	14.		17.	18.	19.
									13.	15.	16.			
3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	14.		17.	18.	19.
									13.	15.	16.			

NOTE: Space is provided in item 12 of face sheet for any additional remarks.

Form 349 (Experimental) 9/81

STAFFING TABLE FACE SHEET	1 CONTROL NO 2800352001145	2 PRIMARY SIC CODE 28	3 SECONDARY SIC CODE –	4 DATE MO DAY YR 3 23 77

5 PRIMARY SIC INDUSTRY NAME Chemicals and Allied Products	6 ESTABLISHMENT NO 352-1242-1145	7 NO OF EMPLOYEES 1242	8 IND DESIG CODE 237	9 NAME OF ANALYST M. Lazor L. Mancinelli	10 T/A CODE

11 INDUSTRY DESIGNATION; PRODUCTS MANUFACTURED OR SERVICES RENDERED (chem.)

This establishment produces a variety of chemicals primarily for industrial use. The major products include:

(1) Polyethylene compounds for use in plastic products and especially for wire and cable insulations.
(2) Polystyrene compounds used in packaging materials, appliances, housewares, toys, furniture, and containers.
(3) Phenolic resins used in bonding automobile clutch and brake linings, grinding wheels, wood bonding and impregnation, thermal and noise insulation, decorative and industrial laminates, and industrial coatings.
(4) Phenol, formaldehyde, and acetone, for establishment use as intermediate products and for sale as final products.

12. REMARKS

This job analysis study covers all departments of the establishment and is primarily for the purpose of gathering source data for the next edition of the DOT. In addition, the establishment requested that a Specific Aptitude Test Battery be developed for the job of General Operator, which is found in six departments (142 total positions).

Page 1 of 12

STAFFING TABLE TITLE SHEET

1 CONTROL NO 2800352001145

2 PRIMARY SIC CODE 28

TREATMENT CODES FOR COLUMN 17
- O - Converted to DOT No job analysis
- V - Verification of previously prepared job analysis
- A - Preparation of complete job analysis
- C - Converted to DOT Job analysis prepared

3. DEPT NO.	4 JOB NO.	5 DEPT NAME/ESTAB JOB TITLE	6 IN-EX	SHIFT NO./TOTAL EMP 7 1	8 2	9 3	10 4	11 TOTAL	12 DOT TITLE	13 INDUST DESIG	14 DOT CODE	15 SOC	16 GOE	17 TR	18 JA REPORT NO./COMMENTS	19. T/A CODE
1	0	PULVERIZED RESINS						21								
	1	Lead Operator, Still Room		1	1			2			558.362	7676	06.02.11	A	352-1242-1145-1	
	2	Warehouse Attendant	X	3	2			5	INDUSTRIAL-TRUCK OPERATOR	any ind.	921.683-050	6518	06.04.40	C	(921.663) 352-1242-1145-2	
	3	Warehouse Attendant	X	1	1			2	STOCK CLERK	clerical	222.387-058	4744	05.09.02	C	352-1242-1145-3	
	4	General Operator (Drill-Press Operator)	X	5	4			9			558.362	7676	06.02.11	V	352-1242-1145-4 same as 352-350-1142-15	
	5	Disposer-Janitor	X	1	1			2	CLEANER, INDUSTRIAL	any ind.	381.687-018	5244	05.12.18	O		
	6	Distribution Specialist		1				1						NO	Not available for study	

NOTE. Space is provided in item 12 of face sheet for any additional remarks.

Form 349 (Experimental) 9/81

CHAPTER 17

JOB ANALYSIS REPORT

Page

Procedures for Preparing the Job Analysis Report 371

Procedures for Preparing the Physical Demands Sheet 376

Procedures for Preparing the Environmental Conditions Sheet 376

Procedures for Preparing the Ratings Estimate Sheet 377

Sample Forms 381

Samples of Completed Job Analysis Reports:

Supervisor, Printer Assembly 388

File Clerk 397

Caster 403

CHAPTER 17

JOB ANALYSIS REPORT

The Job Analysis Report (Form 350) serves a dual purpose as the basic tool for (1) structuring the analysis, and (2) recording the resulting data. It is designed for use by the U.S. Employment Service's Division of Occupational Analysis to gather data primarily for the *Dictionary of Occupational Titles*. As such, many entries have little meaning for other analysts. However, it is adaptable for use by nongovernment organizations as the major entries are functional and standardized.

Each job analysis is an individual study; it should not contain blind references to material recorded elsewhere. Additionally, any codes, estimates, ratings, or the like should be internally consistent and supported by narrative information where required.

Procedures for Preparing the Job Analysis Report (JAR)

Page _____ of _____ : This is the page control number for the report to assure readers that all pages are present. The first entry is page 1, with succeeding pages consecutively numbered in the same order the Job Analysis Report is arranged. The last space uses the same number on each page to reflect the total number of pages contained in the report.

The ID number and the most commonly used establishment job title are to be entered on all supplemental sheets used. (See instructions immediately below.) All attachments, such as drawings, charts, and diagrams, should be counted in the total number of pages of the JAR, and should be inserted in the report in the closest appropriate place ahead of the Physical Demands, Environmental Conditions, and Ratings Estimate Sheets.

ID No.: The identification number of the Job Analysis Report consists of the Establishment Number appearing on the Staffing Table Face Sheet (see Chapter 16) plus a sequential number, starting with number 1, identifying the specific Job Analysis Report. For example, the first of 20 Job Analysis Reports for establishment number 352-500-999 would be 352-500-999-1 and the last, 352-500-999-20. This number is recorded at the top of each page of the report to provide a positive audit trail for the document.

Estab. Job Title: The common establishment job title is also entered at the top of every page of the Job Analysis Report beginning with the second page for identification purposes. (Taken from Item 2, page 1 of the Job Analysis Report.)

1. **(Side Panel):**

DOT Code: Enter either the nine-digit code of the DOT title to which the job converts, or a six-digit code if the job does not convert. The first three digits should match the OGA code entered in Item 1.d. of the Ratings Estimate Sheet, and the next three digits should match the Worker Functions codes assigned for Data, People, and Things (Item 1.a. of the same page). If the job converts to a DOT definition which has a code that the analyst feels is inappropriate, the six-digit suggested code should be entered in parentheses, and the nine-digit published code entered directly above it. Any variation from current DOT coding should be explained in Item 15, General Comments.

Title: If the job studied converts to a job in the DOT, enter the exact DOT title in uppercase letters. Leave this space blank if the job does not convert.

Ind. Desig.: Enter the abbreviated industry designation(s) of the DOT title to which the job converts. Leave this space blank if the job does not convert.

GOE Code-Title: Enter the six-digit code and title of the occupational subgroup from the *Guide for Occupational Exploration* (GOE) into which the job best fits. To assign the GOE code, read the definitions of the interest areas in the GOE and select the most applicable one; next, review the titles of the work groups within the chosen area, read the definitions of those groups which might apply, and select the most appropriate group; finally, review the titles of the subgroups and the DOT titles and codes assigned to each to determine the most appropriate subgroup for the job studied. If it is not possible to narrow the selection to a six-digit subgroup, a four-digit group code and title or a two-digit area code and title may be assigned. The first two digits of the GOE code must match one of the interests circled in Item 2.d. of the Ratings Estimate Sheet.

2. **Estab. Job Title(s):** Record all job titles by which the job is known in the establishment. Enter the most commonly used title first in initial capital letters; if the title is ambiguous or nondescriptive, enter a meaningful, descriptive title after it in parentheses (e.g., the establishment job title "Operator A" might more descriptively be titled "Turbine Generator Operator"). Other establishment titles should follow in lowercase letters separated by semicolons.

— **Positions:** Enter the total number of workers performing the job covered in the Job Analysis Report.

3. **Industry Assign.:** Enter in lowercase letters the abbreviated title of the DOT industry designation assigned for study. If the job being studied is from the "Core List of Primary DOT Occupations," enter the DOT industry in which it is found.

— **Core-List Job:** Enter an "X" in the box if the job studied is on the Core-List.

4. **SIC Code(s) and Title(s):** Enter the code and title from the *Standard Industrial Classification (SIC) Manual* for the four-digit group into which the major activity of the establishment falls. Additional titles and codes for other activities that are found in the establishment should also be listed. When a number of different SIC codes pertain, two- and three-digit SIC codes and titles may be assigned instead to summarize them. Use the short SIC titles listed in Appendix B of the SIC manual.

5. **SOC Code and Title:** Enter the two-, three-, or four-digit code and title of the group definition from the *Standard Occupational Classification (SOC) Manual* that best describes the job.

6. **Job Summary:** Enter a brief but comprehensive statement that describes the overall purpose and nature of the job, following the principles for preparing job summaries found in Chapter 3. The Job Summary must reflect the predominant Worker Functions, Work Fields, and MPSMS entered on the Ratings Estimate Sheet. The job summary should be limited to one sentence. All terms that are defined or described in Items 8, 9, or 10 should be underlined if they first appear in this section; otherwise they are underlined the first time they appear in Item 7.

7. **Description of Tasks:** Describe the tasks of the job, following the concepts and procedures discussed in Chapter 3. Each task must begin with a flag statement and end with an estimated time percentage in parentheses. In some instances, the flag statement may be the entire task statement. All work devices and materials and products that are defined or described in Items 8 and 9, and which do not appear in Item 6, must be underlined the first time they appear in this section. Similarly, technical or little-known terms, or terms with uncommon meanings should be underlined the first time they appear, and defined in Item 10. References to other jobs within the establishment should use establishment titles.

— **Copy to:** Enter the month and year the JAR was transmitted to North Carolina and the Divison of Occupational Analysis in numerical form, e.g., 12/81; enter the abbreviation of the Lead Field Center as well as the month and year of transmittal in the space adjacent to "Lead FC."

8. **Work Devices:** List all work devices used by the worker and include the size, approximate weight, or other identifying information, such as whether floor or bench mounted. Describe in detail any devices that are unusual or special. The two most relevant types of information concerning work devices are size and function. Information that is irrelevant, such as the internal workings of a machine which the worker neither sees nor must know about, should not be included. Devices that vary little in size and shape, and are known to most persons , such as telephones, micrometers, screwdrivers, and pliers, need only be listed and not described. Record first those devices that are described, then record those that are merely listed, the latter separated by semicolons. Described work devices should be recorded in order

of appearance in Items 6 and 7. Components or substances that become part of the final product, such as screws and glue, should not be considered as work devices but instead materials and products and listed in Item 9.

9. **Materials, Products, Subject Matter, and Services:** List, in the same manner as work devices, the raw materials and or finished products with which the worker is involved for jobs assigned an MPSMS rating that reflects a material or product. Define or describe any material or product that is not commonly known or has a unique application. For jobs reflecting a subject matter or service, record a brief description of the subject matter or service.

10. **Definition of Terms:** List, in alphabetical order, and define each term which has been underlined in Items 6 or 7 and does not belong in Items 8 or 9.

11. **Years of Schooling:** Enter the minimum number of years of schooling that the employer requires for the job. If the analyst disagrees with the employer's requirement, an explanation should be made in Item 15 and the phrase "see comments" entered in parentheses after the entry in Item 11. If the employer has no specific educational requirements for the job, enter "no specific educational requirements."

12. **Job Training Time:** Enter in the first vertical column of boxes captioned "Usual," the estimated length(s) of one or more training requirements reflecting the most typical or common way by which workers train for the job. Express estimates in days, weeks, or months, using "d," "w," or "m" as abbreviations. If there are alternate ways by which workers train for the job, enter lengths of those training requirements in appropriate boxes of the columns captioned "Alter." to show up to two alternate routes of JTT. For each training requirement where an estimate is entered, describe the nature and content of the training on the line following the title of the requirement, except on-the-job training (no description necessary). Enter "none" on the lines for training requirements that do not pertain. See Chapter 10 for definitions of training requirements and an explanation of how to estimate the length of each.

If two training requirements are concurrent, enter "Concurrent with" in parentheses on the line to the left of the estimate for the first requirement, and indicate the letter designation of the second requirement.

Total the lengths of usual training requirements, ignoring the shorter estimate in case of concurrent ones. Do not total alternate JTT requirements. Enter the total in the bottom box for "Total JTT," using "d," "w," or "m" as follows:

- If total JTT is 1-4 days: express in days ("d"). The lowest estimate is "1d," which includes any fraction of a day, such as short demonstration.

- If total JTT is 1-3 weeks: express in weeks ("w"), rounded off to the nearest week. 1 week = 5 days.

- If total JTT is over 3 weeks: express in months ("m"), rounded off to the nearest month. 5 weeks = 1 month but 6 weeks = 2 months.

The example which follows shows entries for a supervisory job having a usual JTT consisting of 12 months on-the-job training, 3 weeks concurrent inplant training, and 36 months experience on related jobs; and an alternate JTT consisting of 24 months of college courses and 12 months of on-the-job training.

	Length		
	Usual	Alter.	Alter.
a. High School Courses none			
b. Vocational Courses none			
c. College Courses B.S. degree in Chemistry or other physical science		24m	
d. Apprenticeship none			
e. Inplant Training Plastics Technology (concurrent with f)	3w		
f. On-the-Job Training	12m	12m	
g. Performance on Related Jobs Floorworker; Assistant Supervisor	36m		
Total JTT	48m		

If the analyst knows of other job training requirements for the occupation represented by the job studied, with which the employer may not be familiar or does not require, enter "see comments" on the line after the caption for the requirement and describe in Item 15. Also, if the analyst does not agree with the employer concerning the length of a training requirement in cases where the employer's estimate is clearly out of line with the actual tasks of the job, the analyst's estimate is entered in the box and preceded by an asterisk. The employer's estimate and an explanation of why the analyst feels it is too high or low should be recorded in Item 15.

Vocational preparation achieved through such means as self-instruction, avocations, and travel, is not to be considered as JTT but should be described in Item 12.h.

13. **Licenses, etc.:** List licenses, certification, or registry which indicate attainment of a recognized level of competence and/or which meet Federal, State, or local requirements, such as health cards, licenses for chauffeurs, beauty operators, and pilots, as well as professional licenses for doctors and attorneys.

14. **Promotion and Supervision:**

Promotion From: Record establishment titles of jobs for which the job under study is considered a promotion by the establishment. A wage increase is usually, but not necessarily, involved. If the job from which the worker is promoted reduces the training time of the job under study, the titles must also be listed in Item 12.g. For entry jobs, enter "none."

Promotion To: Record establishment titles of jobs which are considered by the establishment to be promotions from the job under study.

Supervision Received (title): Record establishment job title of worker from whom supervision is received.

Supervision Given (titles): Record all establishment job titles of workers to whom supervision is given, and indicate the number of workers in each title. Include only titles of workers receiving direct line supervision. If titles are too numerous to list completely, either select several representative ones and end list with, "and others," or categorize the types of workers supervised.

15. **General Comments:** Record any necessary comments or explanations concerning any JAR items. Cross-reference all comments with the JAR item number to which they relate. This section is to be reserved for pertinent information for which there is no or insufficient space allowed. Record reasons for analyst's inability to obtain all the required job data. Comments which reflect the analyst's opinion, rather than facts, should be stated as such and, where possible, the rationale for the opinion explained. If the job converts to a DOT definition having alternate titles, comment on whether establishment officials know of their continued use.

16. **Data Collection Method(s):** Enter an "X" in the spaces provided to indicate the method by which the job was studied. An entry for "Other" should be specified.

Data Source(s): Record all sources from which information has been obtained, such as establishment job description, association description, or Occupational Code Request (OCR) form, or show the titles of persons interviewed other than the worker.

Procedures for Preparing the Physical Demands Sheet

Degree of Strenuousness: Circle the symbol S, L, M, H, or VH to indicate the degree of strenuousness estimated for the job. The definitions for the above strength factors appear in Chapter 14.

Factors: Enter an "X" in the appropriate column opposite each factor to indicate whether the activity is not present (N.P.), or present occasionally (O), frequently (F), or constantly (C). See Chapter 14 for definitions of factors and frequency symbols. Circle the number designations of those factors rated important, based on criteria in Chapter 14, pages 331 and 332.

Comments: Record supplemental or clarifying information pertinent to each factor that is rated important. Identify each comment with the corresponding number of the factor. No comment is necessary for factors not rated important. Describe important Physical Demands in terms of duration, weight, distance, and/or other descriptors.

Procedures for Preparing the Environmental Conditions Sheet

Conditions: Enter an "X" in the appropriate column opposite each condition to indicate whether it is not present (N.P.); present under 20 percent of the time and not hazardous (Not Haz.); present under 20 percent of the time and hazardous (Haz.); present 20 percent or more of the time and not hazardous; or present 20 percent or more of the time and hazardous. When potential hazards have been overcome through the use of safety equipment over which the worker has no control, the job is not considered to be hazardous; in such cases, a comment should be made in the "Comments" column for the condition, but no "X" is to be entered in any of the boxes to indicate presence. Circle the number of each condition rated important, based on the criteria in Chapter 15, page 349 and as indicated by entries in the third, fourth, and fifth columns. Items 1 through 7 may or may not be hazardous. Items 8 through 14 consist of conditions which are usually considered to be inherently hazardous. If Item 14 is marked with an "X," the hazard should be specified under the caption "Other:". See Chapter 15 for definitions of conditions, inherent hazards, and criteria for assigning important ratings.

Comments: Record brief descriptions of the circumstances under which the worker is exposed to an important or hazardous environmental condition factor as indicated by an entry in the third, fourth, or fifth columns. Recording comments for conditions other than important or hazardous is optional. Identify each comment with the corresponding number of the condition to which it pertains.

Protective Clothing and Devices: List, and describe if necessary, any clothing or devices such as earplugs, masks, goggles, steel-tipped shoes, insulated gloves, and hard hats, the worker is required to wear to protect against injury or disease.

Procedures for Preparing the Ratings Estimate Sheet

1. **Work Performed Estimates:**

   a. **Worker Functions:** Select the Data, People, and Things Worker Functions that best characterize the job as a whole, and enter the appropriate code in each space provided. Circle the captions, "Data," "People," and/or "Things," to indicate which one(s) best exemplify the job. Worker Functions are fully discussed in Chapter 6.

   b. **Work Fields:** Enter the code and title of up to three Work Fields that reflect the major objective(s) of the job. List in order of importance and separate by semicolons. Work Fields are classified, defined, and discussed in Chapter 7.

c. **MPSMS:** Enter the code and title of up to three Materials, Products, Subject Matter, and Services (MPSMS) classifications (see Chapter 8) that reflect the major areas of worker involvement. List in order of importance and separate by semicolons. Use exact titles of MPSMS categories rather than specific examples; group titles and codes (ending in zero) should be used when three or more categories of that group apply.

d. **OGA Code and Title:** Select and record the three-digit code and title of the most appropriate occupational group from the Occupational Group Arrangement (OGA) of the DOT, based on the definition of the group as well as the definitions of the broader divisions and categories of which it is a part.

2. **Worker Characteristics Estimates:** These estimates are expressed in terms of job characteristics or preferences, not worker qualifications. It is important that all estimates consistently reflect this orientation.

a. **GED:** Enter in the spaces provided for Reasoning, Math, and Language, the numbers corresponding to the levels whose definitions best describe the levels of reasoning, mathematical, and language development, as estimated by the analyst. The concept of GED is fully discussed in Chapter 9.

b. **Job Training Time and Specific Vocational Preparation:** Enter the total estimated length of Job Training Time (JTT) from Item 12 and circle "D," "W," or "M" to indicate whether the total is in "days," "weeks," or "months." Convert to and enter the level of SVP in the space provided, using the scale below:

Scale of Specific Vocational Preparation (SVP)

Level	Time
1	Short demonstration only
2	Anything beyond short demonstration up to and including 30 days
3	Over 30 days up to and including 3 months
4	Over 3 months up to and including 6 months
5	Over 6 months up to and including 1 year
6	Over 1 year up to and including 2 years
7	Over 2 years up to and including 4 years
8	Over 4 years up to and including 10 years
9	Over 10 years

c. **Aptitudes:** Enter a number, one through five, in the box immediately below each aptitude letter to indicate the estimated aptitude level required in the job. If it is determined that an aptitude is not present at all, mark an "X" in the appropriate box rather than recording one of the aptitude levels. Use the task number space under each aptitude letter to record the task number(s) from Item 7 of the JAR only for those aptitudes considered important for average, satisfactory job performance. If an aptitude is considered important, it *must* be identified in at least one task statement. If an aptitude is found in two tasks, both numbers should be entered, separated by a diagonal line (/). More than two task numbers for a single aptitude should be indicated by an "S" (several). Leave task numbers blank for all aptitudes marked with an "X" and for others considered not to be important for satisfactory job performance. Aptitudes are discussed and defined in Chapter 11.

d. **Interests:** Circle the numbers of up to three interest factors that apply to the job as a whole or to an important aspect of the job. The interest factors are discussed and defined in Chapter 12. At least one entry must match the first two digits of the GOE code shown in Item 1, page 1, of the Job Analysis Report.

e. **Temperaments:** Circle the letter designations of one or more temperament factors considered to be important in relation to the kinds of adjustments which the worker must make for successful job performance. See Chapter 13 for a full explanation of temperaments and definitions of the temperament factors.

3. **Keywords:**

a. **Occupational Unit:** Enter the number and title of the occupational unit from the *Handbook of Occupational Keywords* (HOOK) that best characterizes the job as a whole.

b. **Core Keyword(s):** Enter the numeric indicators and their keyword or keywords which best describe the major purpose of the job. In some instances the job title itself may serve as the core keyword, or provide a clue as to what it or they might be.

c. **Additional Keywords:** Enter occupationally significant numeric indicators and their keywords which reflect well-known educational requirements, work activities, materials, products, subject matter, services, machines, tools, equipment, work aids, systems, specialties, tests, processes, environments, and language requirements.

Analysts may encounter a number of occupationally significant words for "b" or "c" above, which are not keywords. These should be included, and option numeric indicators assigned.

Analyst and Reviewer Identification: Enter the name of the analyst who prepared the Job Analysis Report, the date completed, the name of the Field Center staff member who reviewed it, the name and title of the establishment reviewer, and the dates of each review.

Samples of the Job Anaysis Report

Samples of the Job Analysis Report Form as well as completed Job Analysis Reports appear on pages 381 through 410.

JOB ANALYSIS REPORT

Page 1 of ____

ID No. ____________

1. DOT Code ____________ Title ____________ Ind. Desig. ____________

GOE Code-Title ____________

2. Estab. Job Title(s) ____________

____________ Positions ____

3. Industry Assign. ____________ Core-List Job ☐

4. SIC Code(s) and Title(s) ____________

____

5. SOC Code and Title ____________

6. Job Summary:

7. Description of Tasks:

Copy to: NC ____ DOA ____ Lead FC ____________

Form 350 (Experimental) 1/82

Page _ ___ of _____

ID No. ____________________

Estab. Job Title

---

7. Description of Tasks (cont'd.):

Page ____ of ____

ID No. ____________

Estab. Job Title ____________________________

8. Work Devices:

---

9. Materials, Products, Subject Matter, and Services:

---

10. Definition of Terms:

Page ____ of ____

ID No. ________________

Estab. Job Title ____

11. Years of Schooling ________________

12. Job Training Time	Length		
	Usual	Alter.	Alter.
a. High School Courses			
b. Vocational Courses			
c. College Courses			
d. Apprenticeship			
e. Inplant Training			
f. On-the-Job Training			
g. Performance on Related Jobs			
Total JTT			

h. Other training or experience: ________________________________

13. Licenses, etc. ________________________________

14. Promotion and Supervision

Promotion: From ________________ to ________________

Supervision Received (title) ________________________________

Supervision Given (titles) ________________________________

15. General Comments:

16. Data Collection Method(s): Observation-Interview ____ Interview Only ____ Other ________

Data Source(s): ________________________________

PHYSICAL DEMANDS

Page ______ of ______

ID No. ____________________

Estab. Job Title ____________________

Degree of Strenuousness S L M H VH

FACTORS	N.P.	Present O	Present F	Present C	COMMENTS
1. Standing					
2. Walking					
3. Sitting					
4. Reclining					
5. Lifting					
6. Carrying					
7. Pushing					
8. Pulling					
9. Climbing					
10. Balancing					
11. Stooping					
12. Kneeling					
13. Crouching					
14. Crawling					
15. Reaching					
16. Handling					
17. Fingering					
18. Feeling					
19. Talking					
20. Hearing					
21. Tasting/Smelling					
22. Near Vision					
23. Midrange Vision					
24. Far Vision					
25. Depth Perception					
26. Visual Accommodation					
27. Color Vision					
28. Field of Vision					

ENVIRONMENTAL CONDITIONS

Page _____ of _____

ID No. ____________________

Estab. Job Title

CONDITIONS	N.P.	Present Under 20%		Present 20% or Over		COMMENTS
		Not Haz.	Haz.	Not Haz.	Haz.	
1. Exposure to Weather						
2. Extreme Cold						
3. Extreme Heat						
4. Wet and/or Humid						
5. Noise						
6. Vibration						
7. Atmospheric Conditions						
Inherent Hazards						
8. Moving Mechanical Parts		▨		▨		
9. Electric Shock		▨		▨		
10. High, Exposed Places		▨		▨		
11. Radiant Energy		▨		▨		
12. Explosives		▨		▨		
13. Toxic or Caustic Chem.		▨		▨		
14. Other:		▨		▨		

Protective Clothing and Devices

RATINGS ESTIMATE SHEET

Page ____ of ____

ID No. ____________________

Estab. Job Title ____

1. WORK PERFORMED ESTIMATES:

a. Worker Functions Data ____ People ____ Things ____

b. Work Fields ____

c. MPSMS ____

d. OGA Code and Title ____

2. WORKER CHARACTERISTICS ESTIMATES:

a. GED Reasoning ____ Math ____ Language ____

b. Job Training Time ____ D W M (SVP____)

	G	V	N	S	P	Q	K	F	M	E	C
c. Aptitudes Level											
Task No.											

d. Interests 01 02 03 04 05 06 07 08 09 10 11 12

e. Temperaments D R I V E A S T U P J

3. KEYWORDS:

a. Occupational Unit ____

b. Core Keyword(s) ____

c. Additional Keywords ____

Analyst ______________________________ Date ____________

Field Center Reviewer ______________________________ Date ____________

Establishment Reviewer ____________________ Title ____________ Date ____________

JOB ANALYSIS REPORT

Page 1 of 9

ID No. 232-1500-200-7

1. DOT Code 706.131-014 Title SUPERVISOR, ASSEMBLY (see comments) Ind. Desig. office mach.

GOE Code-Title 06.02.01 Supervision

2. Estab. Job Title(s) Supervisor, Printer Assembly

Positions 5

3. Industry Assign. office mach. Core-List Job ☐

4. SIC Code(s) and Title(s) 3573 Electronic Computing Equipment

5. SOC Code and Title 71 Supervisors: Production Occupations

6. Job Summary:

Supervises and coordinates activities of Assemblers and other production workers engaged in assembly of high-speed Printers in establishment that manufactures computers and peripheral equipment.

7. Description of Tasks:

1. Plans and schedules production activities, issues and interprets instructions to workers, and assigns work: Reviews Master Schedule, Revised Schedule, and Process Sheets to determine job-order priorities, production quotas, product specifications, materials needed, and number and types of workers and operations required. Plans and schedules department activities based on priorities, availability of staff and materials, knowledge of product characteristics, and capacities of machines and equipment. Prepares or revises written work schedules in accordance with planned production. Issues and interprets instructions and specifications to workers. Assigns workers to specific assembly operations and work stations, based on skills and job classifications of workers, availability of Utility Workers to fill in for absent workers, and number and types of operations required for model printer in production. Occasionally reassigns workers to other jobs to adjust for shortages of workers in specific job classifications. (10%)

2. Coordinates and expedites production: Reviews Hot List to determine availability and quantities of parts required for production. Notifies Production Manager of parts in short supply or out of stock. Writes requests for additional workers from other departments to relieve staff shortages. Orders switch to production of simpler or different printer models, based on availability of parts and workers, to reduce number of required assembly operations or to negate need for unavailable parts. Monitors assembly-line workflow for bottlenecks and assigns Utility Workers to assist at sites of bottlenecks. Orders removal of defective units from assembly line and storage of units at repair stations. Orders shutdown of assembly line when insufficient numbers of workers remain at nonrepair work stations to keep line running. Reviews production reports to monitor quantities of each model printer produced daily and weekly, compares totals to data in Master or Revised Schedule

Copy to: NC 11/81 DOA 11/81 Lead FC NY 11/81

Form 350 (Experimental) 1/82

371

Estab. Job Title Supervisor, Printer Assembly

7. **Description of Tasks (cont'd.):**

and directs assembly line to switch models when monthly quota is met. Confers with other Printer Assembly Supervisors to coordinate department activities. (20%)

3. Evaluates work of subordinates: Uses magnifiers and precision and fixed gages to examine and measure components and subassemblies at various stages of production to ensure compliance with standards and prescribed work procedures. Determines if rejects are due to defective parts or faulty assembly. Consults with Quality Control Inspector to confirm findings. Observes worker performance, inspects finished work, and confers with Job Leader to monitor and evaluate performance of individual workers. Takes corrective action, such as arranging for retraining or change in work assignment. (10%)

4. Trains and provides technical assistance to workers: Demonstrates methods of hand assembly, use of hand and power tools, and operation of bench machines at various work stations of assembly line. Assigns trainees to Job Leader or experienced Assemblers for continuation of on-the-job training. Provides advice, guidance, and assistance to workers having difficulty in performing job duties or to resolve specific work-related problems, such as modifying assembly techniques to accomodate changed or slightly off-dimension components. Assists workers in improving work techniques to increase efficiency and/or reduce fatigue. (15%)

5. Performs administrative-supervision and personnel activities: Interprets company policies to workers and enforces safety regulations. Maintains discipline, morale, and harmonious relations among workers. Recommends or initiates personnel actions, such as promotions, transfers, discharges, and disciplinary measures, in accordance with company policy and collective bargaining agreement. Meets with workers, union representatives, and/or staff of other departments to resolve worker grievances or to take disciplinary action for infractions of company rules. (15%)

6. Prepares, maintains, and reviews forms, records, and reports: Checks workers' production cards for completeness and accuracy of entries and determines total number of units assembled. Tallies daily department production and records total number of units assembled and reasons for not meeting daily quota on Production Slip. Posts daily production totals for each model printer in notebook for comparison with Master or Revised Schedule. Reviews workers' timecards weekly and enters lengths of and reasons for lateness and absence into attendance records. Prepares Verbal Warning Record or Discipline Report for first and subsequent worker infractions of company rules prior to meeting with worker and/or union representative. Enters number of workers in each job title for department to prepare Monthly Headcount. Prepares requisition forms to order tools, office supplies, and equipment repairs. Prepares Overtime Approval Form when overtime is anticipated. Transcribes previous month's actual and budgeted costs for operation from monthly Budget Report onto budget worksheet. Operates calculator to compute and record cost of operation in terms of percentage of monthly and year-to-date budgeted amounts. Records reasons for operational costs which exceed budget.

Estab. Job Title Supervisor, Printer Assembly

7. **Description of Tasks (cont'd.):**

Annually reviews previous year's actual costs for each department operation. Computes estimated operational costs for next calendar year, based on known or anticipated costs of materials and labor and scheduled production of each printer model to prepare annual budget. Delivers or routes completed forms, records, and reports to Production Manager or other designated staff member for use and/or approval. (15%)

7. Sets up, adjusts, and repairs machines and equipment: Sets up, adjusts, and performs minor repairs on assembly-line bench machines, power tools, and gages, such as Ty-rap Machine, Wire Twister, Air Crimper, Ty-rap Tool, and Belt Gage, using handtools, diagrams, and manuals. Summons Maintenance Repairer for more difficult repairs. (5%)

8. Recommends improvements in work methods and procedures: Analyzes quality of product and productivity reports from printer-assembly departments. Periodically meets with Production Manager, other Printer Assembly Supervisors, quality control staff, and Engineers to discuss reasons why production quotas were not met. Recommends measures to improve production methods, product quality, and worker efficiency, applying technical knowledge of product, assembly techniques, work devices, and worker capabilities. Initiates, monitors, and evaluates tryout of approved new procedures and prepares verbal and written reports of success for Production Manager. (5%)

9. Performs work of subordinates: Occasionally assembles, adjusts, and repairs printers at workbench or conveyor line, using variety of standard and special-purpose handtools, power tools, soldering iron, bench machines, precision and fixed gages, assembly fixtures, and process sheets, functioning as Utility Worker during periods of staff shortage or heavy production activity. (5%)

Estab. Job Title Supervisor, Printer Assembly

8. **Work Devices:**

Master Schedule: Projected production schedule for calendar year showing number of units of each model to be produced each month.

Revised Schedule: Revised versions of Master Schedules, issued irregularly throughout the year.

Process Sheets: Forms that contain assembly instructions, part names, and identification numbers for each operation in the assembly of a specific model high-speed printer.

Hot List: Listing of required parts for each assembly line and the number of days supply on hand for each.

Production Slip: Form submitted to Production Manager to inform of daily production of department and reasons for failing minimum acceptable levels of production.

Verbal Warning Record: Three-copy form prepared as first step of disciplinary procedure to serve as warning for first infraction of company regulation by worker, and issued to worker at meeting with supervisor. Entries include employee identification, date and nature of offense, extent of union notification and representation at meeting, and signature of supervisor.

(continued on page 5.)

9. **Materials, Products, Subject Matter, and Services:**

Printers: Alphanumeric, high-speed, impact printers used as part of retail point-of-sale terminal systems or financial/banking systems, that print transactions or computerized data on rolls of paper or inserted forms, such as sales slips and bankbooks. The printing is accomplished by action from 2 to 6 high-speed print solenoids whose needle-like heads produce a dot matrix by impacting the paper through a continuous inked ribbon of over 1,000 strokes per second. The printers weigh from 7 to 10 lbs. and are housed primarily in plastic.

Wires; screws; spacers; nuts; washers; studs; springs; brackets; solenoids; harnesses; plastic housings; frames; collars; cams; bearings; shafts; gears; belts; motors; clutches; rollers; hinges; blades; switches; solder; glue; lubricants; labels; stickers; printed circuit boards; and other printer components.

10. **Definition of Terms:**

None

Estab. Job Title Supervisor, Printer Assembly

8. Work Devices: (continued from page 4.)

Discipline Report: Same as Verbal Warning Report but has additional section for disciplinary action taken. Used for second and third infractions, for which disciplinary action is usually precribed.

Monthly Headcount: Listing of department job titles with boxes for recording number of positions within each.

Overtime Approval Form: Form on which the names of workers for whom overtime is requested and the amount of overtime are entered for approval by Manager.

Budget Report: Computer printout containing data, by department, on actual and budgeted costs for each operation. Used by supervisors for preparation of monthly departmental budget reports and annual budgets for coming year.

Ty-rap Machine: Bench-mounted, treadle-controlled machine that wraps plastic ties tightly around bunched wires and trims off excess portion of wrapped tie.

Wire Twister: Bench-mounted, button-controlled machine that twists together stripped ends of two or more wires; contains four twisting heads for simultaneous twisting of up to four sets of wires.

Air Crimper: Pneumatic, trigger-controlled power tool that crimps plastic cap over twisted ends of two or more ground wires; hangs over workbench, attached to air line.

Ty-rap Tool: Trigger-controlled power tool that tightens manually tied plastic ties around wires and snips off excess portion of tie.

Belt Gage: Gage used to reposition motor and measure motor-belt tension to allow for adjustment.

Requisition forms; timecards; attendance records; work sheets; calculator; telephone; desk; company manuals; machine and power tool manuals; union contract; notebook; pens/pencils; manufacturing schedule; work schedules; productivity reports; diagrams; magnifiers; precision and fixed gages; standard and special-purpose handtools and power tools; soldering iron; assembly fixtures; workbench; and conveyor belt.

Page 6 of 9

ID No. 232-1500-200-7

Estab. Job Title Supervisor, Printer Assembly

11. Years of Schooling 12

12. Job Training Time

	Length		
	Usual	Alter.	Alter.
a. High School Courses none			
b. Vocational Courses none			
c. College Courses Associate degree in Electronics Technology		24m	
d. Apprenticeship none			
e. Inplant Training none			
f. On-the-Job Training	6m	6m	
g. Performance on Related Jobs Troubleshooter and/or Job Leader; Electronics Tech. in Military	60m	24m	
Total JTT	66m		

h. Other training or experience: none

13. Licenses, etc. none

14. Promotion and Supervision

Promotion: From Job Leader to Production Manager

Supervision Received (title) Production Manager

Supervision Given (titles) Assembler (7-42); Stockman (1); Production Inspector (1); Adjuster (1-3); Tester (2-5); Repairer (2-5); Utility Worker (3); Troubleshooter (1); and Job Leader (1).

15. General Comments:

Item 1: Analyst feels the base definition of SUPERVISOR (office mach.), 706.131-014 should be broadened to include other types of office machines in addition to typewriters. This specific job converts to the U. R. title, SUPERVISOR, ASSEMBLY (office mach.).

16. Data Collection Method(s): Observation-Interview X Interview Only ___ Other ___

Data Source(s): Production Manager; company job description

PHYSICAL DEMANDS

Page 7 of 9

ID No. 232-1500-200-7

Estab. Job Title Supervisor, Printer Assembly

Degree of Strenuousness S [✓ L] M H VH

FACTORS	N.P.	Present			COMMENTS
		O	F	C	
1. Standing			X		
2. Walking			X		
3. Sitting			X		
4. Reclining	X				
5. Lifting		X			
6. Carrying		X			
7. Pushing		X			
8. Pulling		X			
9. Climbing	X				
10. Balancing	X				
11. Stooping		X			
12. Kneeling	X				
13. Crouching		X			
14. Crawling	X				
⑮ Reaching			X		15. Reaches for forms, records, reports, manuals, and other work devices.
⑯ Handling			X		16. Handles magnifiers and precision and fixed gages, various components and subassemblies, and hand and power tools.
⑰ Fingering		X			17. Operates calculator to prepare various reports.
18. Feeling	X				
⑲ Talking			X		19. and 20. Gives instructions and directions to subordinates, receives oral reports of work problems and progress from subordinates, and confers with Production Manager and staff from other departments.
⑳ Hearing			X		
21. Tasting/Smelling	X				
㉒ Near Vision			X		22. and 26. Reads, compiles, computes, and records data, and examines and measures various components and subassemblies.
23. Midrange Vision			X		
24. Far Vision		X			
25. Depth Perception	X				
㉖ Visual Accommodation		X			
27. Color Vision		X			
28. Field of Vision	X				

ENVIRONMENTAL CONDITIONS

Page 8 of 9

ID No. 232-1500-200-7

Estab. Job Title Supervisor, Printer Assembly

CONDITIONS	N.P.	Present Under 20% Not Haz.	Present Under 20% Haz.	Present 20% or Over Not Haz.	Present 20% or Over Haz.	COMMENTS
1. Exposure to Weather	X					
2. Extreme Cold	X					
3. Extreme Heat	X					
4. Wet and/or Humid	X					
5. Noise		X				5. Intermittent noise from power tools and bench machines.
6. Vibration	X					
7. Atmospheric Conditions	X					
Inherent Hazards						
8. Moving Mechanical Parts	X					
9. Electric Shock	X					
10. High, Exposed Places	X					
11. Radiant Energy	X					
12. Explosives	X					
13. Toxic or Caustic Chem.	X					
14. Other:	X					

Protective Clothing and Devices

none

RATINGS ESTIMATE SHEET Page 9 of 9

ID No. 232-1500-200-7

Estab. Job Title Supervisor, Printer Assembly

1. WORK PERFORMED ESTIMATES:

a. Worker Functions Data 1 People 3 Things 1

b. Work Fields 111 Electrical-Electronic Fabricating-Installing-Repairing; 232 Numerical Recording-Recordkeeping; 212 Inspecting-Measuring-Testing

c. MPSMS 571 Office, Computing, and Accounting Machines

d. OGA Code and Title 706 Metal Unit Assemblers and Adjusters, n.e.c.

2. WORKER CHARACTERISTICS ESTIMATES:

a. GED Reasoning 4 Math 3 Language 4

b. Job Training Time 66 D W [✓ M] (SVP 8)

c. Aptitudes

Aptitudes	G	V	N	S	P	Q	K	F	M	E	C
Level	3	3	3	4	3	3	3	3	3	X	4
Task No.	S	S	S			S		S			

d. Interests 01 02 03 04 05 [✓ 06] [✓ 07] 08 09 10 [✓ 11] 12

e. Temperaments [✓ D] R I [✓ V] E A S [✓ T] U [✓ P] [✓ J]

3. KEYWORDS:

a. Occupational Unit 25 Technical/Electrical Equipment Fabricating

b. Core Keyword(s) 57942 Elect/Electronic Fabricating; 58047 Tech Products Fabricating

c. Additional Keywords 37968 Supervisor; 54110 Assembling Process; 54384 EDP Printers; 26648 Manufacturing Plants

Analyst Florence Fields Date 10/15/81

Field Center Reviewer William Schaeffer Date 10/30/81

Establishment Reviewer Stephen Simmons Title Production Manager Date 11/17/81

JOB ANALYSIS REPORT

Page 1 of 6

ID No. 542-68-2056-1

1. DOT Code 206.362-010 (see comments) (206.387) Title FILE CLERK I Ind. Desig: clerical

GOE Code-Title 07.07.01 Filing

2. Estab. Job Title(s) File Clerk; document clerk

Positions 2

3. Industry Assign. clerical Core-List Job ☒

4. SIC Code(s) and Title(s) 2271 Woven Carpets and Rugs

5. SOC Code and Title 4696 File Clerks

6. Job Summary:

Files correspondence, invoices, sales orders, and related computer printouts numerically, alphabetically, or chronologically, and checks computer printouts against sales orders to detect and correct errors.

7. Description of Tasks:

1. Sorts documents preparatory to filing: Receives invoices, sales orders, and correspondence from Order Department and Mailroom. Places documents in designated trays to sort according to type and fiscal year. Removes stack of sorted documents from trays and inserts documents alphabetically in tabbed sections of Divider Folder. (30%)

2. Maintains filing system: Removes documents from alphabetical sections of divider folder and carries to filing cabinet. Pulls out drawer and locates file folder according to account number, using foot stool to reach high drawers. Places document in front of other documents in file folder. Repeats process until all sorted documents are filed. Peels off and presses printed labels containing new accounts' names and code numbers onto new file folders and files folders alphabetically. Removes file folders for accounts appearing on Change Listing, corrects labels, and refiles folders according to revised information. Chronologically files computer printouts. Locates and removes specified documents from files as requested by Office Supervisor or Administrative Manager. (45%)

3. Reviews computer printouts to detect and correct errors: Checks sales order data on computer printouts, such as customer's name, shipping address, order control number, customer order number, style description and number, color name and number, and size of carpet, against corresponding data on handwritten sales orders to detect errors. Marks errors on computer printouts, using pen. Takes copies of sales orders and matching computer printouts containing errors to Order Department for correction. Stacks correct copies of computer printouts and sales orders for sorting and filing. (20%)

4. Performs miscellaneous related duties: Tends photocopy machine to duplicate documents. Orally requests office supplies from Mail Clerk. Answers telephone, takes messages, and routes calls to workers. (5%)

Copy to: NC 10/81 DOA 10/81 Lead FC N/A

Estab. Job Title File Clerk

8. Work Devices:

Divider Folders: Accordian-type folders containing alphabetically tabbed divider sheets used for initial sort of documents prior to filing.

Filing Cabinets: Floor-mounted, 5'5" high, with drawers 12" high, 15" wide, and 40" deep. Filing system consists of four sets of files.

Change Listing: Daily list of revised names and/or code numbers of current accounts.

Invoices; sales orders; correspondence; computer printouts; trays; file folders; foot stool; pen/pencil; printed labels; photocopy machine; desk; and telephone.

9. Materials, Products, Subject Matter, and Services:

Filing and related clerical services.

10. Definition of Terms:

None

Estab. Job Title File Clerk

11. Years of Schooling No specific educational requirements

12. Job Training Time	Length Usual	 Alter.	 Alter.
a. High School Courses none			
b. Vocational Courses none			
c. College Courses none			
d. Apprenticeship none			
e. Inplant Training none			
f. On-the-Job Training	1w		
g. Performance on Related Jobs none			
Total JTT	1w		

h. Other training or experience: none

13. Licenses, etc. none

14. Promotion and Supervision

Promotion: From none to Order Editor; Order Clerk

Supervision Received (title) Office Supervisor

Supervision Given (titles) none

15. General Comments:

Item 1 (Code): Analyst feels the worker function ratings of the DOT code for FILE CLERK I should probably be .387 rather than .362. 362 does not seem to be justified either for this job or for the DOT definition because Speaking-Signaling is not evident and Operating-Controlling is at best incidental.

16. Data Collection Method(s): Observation-Interview X Interview Only ___ Other ___

Data Source(s): Office Supervisor; Administrative Manager; company job description

PHYSICAL DEMANDS

Page 4 of 6

ID No. 542-68-2056-1

Estab. Job Title File Clerk

Degree of Strenuousness S [✓ L] M H VH

FACTORS	N.P.	Present			COMMENTS
		O	F	C	
① Standing			X		1. Stands to maintain filing system.
2. Walking		X			
3. Sitting			X		
4. Reclining	X				
5. Lifting		X			
6. Carrying		X			
7. Pushing		X			
8. Pulling		X			
9. Climbing		X			
10. Balancing		X			
11. Stooping		X			
12. Kneeling		X			
13. Crouching		X			
14. Crawling	X				
⑮ Reaching			X		15. and 16. Reaches for and handles file drawers, documents, folders, and pen to sort, file, label, and record.
⑯ Handling			X		
17. Fingering		X			
18. Feeling	X				
19. Talking		X			
20. Hearing		X			
21. Tasting/Smelling	X				
㉒ Near Vision			X		22. and 23. Required to sort, file, and check documents.
㉓ Midrange Vision			X		
24. Far Vision	X				
25. Depth Perception	X				
㉖ Visual Accommodation			X		26. Required to shift gaze from documents to file folder labels and from one document to another.
27. Color Vision	X				
28. Field of Vision	X				

ENVIRONMENTAL CONDITIONS

Page 5 of 6

ID No. 542-68-2056-1

Estab. Job Title File Clerk

CONDITIONS	N.P.	Present Under 20%		Present 20% or Over		COMMENTS
		Not Haz.	Haz.	Not Haz.	Haz.	
1. Exposure to Weather	X					
2. Extreme Cold	X					
3. Extreme Heat	X					
4. Wet and/or Humid	X					
5. Noise	X					
6. Vibration	X					
7. Atmospheric Conditions	X					
Inherent Hazards						
8. Moving Mechanical Parts	X	■		■		
9. Electric Shock	X	■		■		
10. High, Exposed Places	X	■		■		
11. Radiant Energy	X	■		■		
12. Explosives	X	■		■		
13. Toxic or Caustic Chem.	X	■		■		
14. Other:	X	■		■		

Protective Clothing and Devices

none

RATINGS ESTIMATE SHEET

Page 6 of 6

ID No. 542-68-2056-1

Estab. Job Title File Clerk

1. WORK PERFORMED ESTIMATES:

a. Worker Functions [✓ Data] 3 People 8 [✓ Things] 7

b. Work Fields 231 Verbal Recording-Recordkeeping

c. MPSMS 891 Clerical Services, Except Bookkeeping

d. OGA Code and Title 206 File Clerks

2. WORKER CHARACTERISTICS ESTIMATES:

a. GED Reasoning 3 Math 1 Language 2

b. Job Training Time 1 D [✓ W] M (SVP 2)

c. Aptitudes	G	V	N	S	P	Q	K	F	M	E	C
Level	4	3	5	4	4	2	3	4	4	X	5
Task No.		S				S	1/2				

d. Interests 01 02 03 04 05 06 [✓ 07] 08 09 10 11 12

e. Temperaments D [✓ R] I V E A S T [✓ U] P J

3. KEYWORDS:

a. Occupational Unit 14 Clerical

b. Core Keyword(s) 46583 Filing Work: Data Verification Work (suggested new primary term for OU 14).

c. Additional Keywords 14344 Documents

Analyst John Wilson Date 9/28/81

Field Center Reviewer Sam Smith Date 10/2/81

Establishment Reviewer Mary Jones Title Office Supervisor Date 10/7/81

JOB ANALYSIS REPORT

Page 1 of 8

ID No. 412-300-1510-5

1. DOT Code 502.685 Title ______ Ind. Desig. ______

GOE Code-Title 06.02.10 Equipment Operating, Metal Processing

2. Estab. Job Title(s) Caster; casting-machine operator; centrifugal caster

Positions 2

3. Industry Assign. jewelry Core-List Job ☐

4. SIC Code(s) and Title(s) 3911 Jewelry, Precious Metal

5. SOC Code and Title 7542 Molding and Casting Machine Operators and Tenders

6. Job Summary:

Tends Centrifugal-Casting Machine that casts gold into rings and Ultrasonic Cleaner and Hydrofinish Machine to clean and polish cast rings, working for manufacturer of gold jewelry.

7. Description of Tasks:

1. Prepares for casting: Receives written work order from Casting Room Foreman, indicating size, style, gold type, and quantity of rings to be cast, Mold number, and crucible heat setting. Walks to Investing Department, locates molds on shelf by identification number, places required quantity on metal tray, carries to preheated Gas Oven in own work area, and inserts tray into gas oven to heat molds preparatory to casting. Walks to Gold Room, shows work order to Foreman, receives required number of paper bags of Gold Bars, and carries one or two bags at a time to worktable in Casting Department. Checks contents to verify that gold bars are imprinted with specified gold type. Places open bag next to centrifugal-casting machine. Copies work-order data, name, and shift number on Production Slip. Clips slip to work order for subsequent use in tallying production. (5%)

2. Tends centrifugal-casting machine: Scoops gold bars from bag and deposits into crucible of centrifugal-casting machine, using hand scoop, until bars reach "full" line. Turns heat control to prescribed setting, drops flux pellet into crucible to prevent accumulation of slag, and waits for gold to melt. Removes preheated mold from gas oven, using tongs, positions mold on holding plate at end of casting machine arm, and secures mold to arm with spring clamp. Presses button on edge of worktable to actuate centrifugal spinning action of machine arms that force molten gold outward from crucible into mold. Manually releases spring clamp to release mold when machine automatically stops. Places mold on worktable to cool for specified period of time, using tongs. Repeats operation until specified number of rings are cast. (50%)

3. Removes cast rings from molds and sprue from rings: Breaks cooled mold, using mallet, and removes cast ring. Cuts sprue from ring, using clippers, and smooths remaining burr, using hand file. Places

Copy to: NC 9/81 DOA 9/81 Lead FC Fla 9/81

Form 350 (Experimental) 1/82

ID No. 412-300-1510-5

Estab. Job Title Caster

7. **Description of Tasks (cont'd.):**

deburred rings in wire-mesh basket preparatory to cleaning and polishing. (5%)

4. Tends ultrasonic cleaner to clean rings: Immerses basket of rings into water tank of ultrasonic cleaner. Switches on ultrasound at preset intensity to remove mold particles and other impurities from rings by action of soundwaves through water. Switches off ultrasound after standard period of time and removes basket of rings from tank. (10%)

5. Tends hydrofinish machine to polish rings: Places basket of rings into chamber of hydrofinish machine. Closes plexiglass chamber door, flips switch to actuate spray of glass shot and water inside chamber, slips hands into protective gloves protruding into chamber, picks up ring from basket, and holds and rotates ring slowly under spray to expose all surfaces for polishing. Removes ring from under spray after approximate standard period of time and inserts onto holding spindle on inner wall of chamber. Repeats operation until all rings in basket are polished. Withdraws hands from gloves, switches off machine, opens chamber door, and removes rings and empty basket. Places each ring in section of felt-lined, sectioned tray for end-of-shift count. (25%)

6. Tallies production and routes polished rings to next process: Counts polished rings in sectioned trays at end of workshift and records totals of each style, size, and gold type on production slip. Places production slip and work order in trays containing completed job orders and places stack of trays on shelf for pickup by Engraving Department worker. (5%)

8. **Work Devices:**

Centrifugal-Casting Machine: Bench-mounted machine that centrifugally forces molten gold from crucible into mold to form gold ring. Consists of a round base, about 3" high and 3" in diameter, from which a pair of foot-long arms extend in opposite directions. A 4" diameter crucible is located 6" from end of the arm that has a mold-holding plate and clamp at its end; a counterweight is mounted at end of other arm to permit level spinning of arms. A 3' diameter, 12" high protective metal shield surrounds machine.

Ultrasonic Cleaner: Floor-mounted tub, 4' high and 3' in diameter, which contains water and an ultrasound generator. Ultrasound waves in water cause a scrubbing action which cleans immersed rings.

Hydrofinish Machine: Floor-mounted, 6' high machine with a 4' diameter plexiglass chamber, used to spray rings with water and glass shot to polish gold surface. Rubber gloves attached to inner chamber permit manipulation of rings while protecting worker from spray.

Mold: Plaster of paris mold, about 1½" in diameter, in which molten gold is cast into a ring; has sprue hole to permit entry of molten gold into mold cavity.

(continued on page 4.)

9. **Materials, Products, Subject Matter, and Services:**

Gold Bars: Bars of gold, 3/4" X 1/4" X 1/4", in 10 kt., 14 kt., and 18 kt. white and yellow gold imprinted with karat number. When stored in paper sacks, weighs approximately 6 pounds.

Gold Rings: Plain band-type wedding rings.

10. **Definition of Terms:**

None

Estab. Job Title Caster

8. **Work Devices**: (continued from page 3.)

Gas Oven: Floor-mounted oven, 7' high, 2½' wide, and 2' deep, used to preheat molds.

Work orders; metal trays; paper bags; production slips; pen/pencil; hand scoop; flux pellets; tongs; worktable; mallet; clippers (cutting pliers); hand file; wire-mesh baskets; water; glass shot; felt-lined, sectioned trays; shelves; and chair.

Estab. Job Title Caster

11. **Years of Schooling** No specific educational requirements

12. Job Training Time		Length		
		Usual	Alter.	Alter.
a. High School Courses	none			
b. Vocational Courses	none			
c. College Courses	none			
d. Apprenticeship	none			
e. Inplant Training	none			
f. On-the-Job Training		2m	1m	
g. Performance on Related Jobs	Helper, Gold Room		3m	
	Total JTT	2m		

h. **Other training or experience:** none

13. **Licenses, etc.** none

14. **Promotion and Supervision**

Promotion: From none **to** Foreman, Casting Room

Supervision Received (title) Foreman, Casting Room

Supervision Given (titles) none

15. **General Comments:**

None

16. **Data Collection Method(s):** Observation-Interview X Interview Only ___ Other ___

Data Source(s): Foreman, Casting Room

PHYSICAL DEMANDS

Page 6 of 8

ID No. 412-300-1510-5

Estab. Job Title Caster

Degree of Strenuousness S [✓ L] M H VH

FACTORS	N.P.	Present O	F	C	COMMENTS
① Standing			X		1. Stands (75%) while tending machines and equipment.
2. Walking		X			
3. Sitting		X			
4. Reclining	X				
⑤ Lifting		X			5. and 6. Lifts and carries metal trays, bags of gold bars, molds, and baskets.
⑥ Carrying		X			
7. Pushing		X			
8. Pulling		X			
9. Climbing	X				
10. Balancing	X				
11. Stooping	X				
12. Kneeling	X				
13. Crouching	X				
14. Crawling	X				
⑮ Reaching			X		15., 16., and 17. Reaches for, handles, and fingers rings, molds, controls, and other work devices.
⑯ Handling			X		
⑰ Fingering			X		
18. Feeling	X				
19. Talking		X			
20. Hearing		X			
21. Tasting/Smelling	X				
㉒ Near Vision			X		22. Reads machine and equipment control settings, examines rings for cleanliness and finish, reads work orders, and tallies and records production totals.
㉓ Midrange Vision			X		23. Clamps molds onto arm of casting machine and views rings through window of hydro-finish machine.
24. Far Vision	X				
25. Depth Perception	X				
26. Visual Accommodation	X				
27. Color Vision		X			
28. Field of Vision	X				

ENVIRONMENTAL CONDITIONS

Page 7 of 8

ID No. 412-300-1510-5

Estab. Job Title Caster

CONDITIONS	N.P.	Present Under 20%		Present 20% or Over		COMMENTS
		Not Haz.	Haz.	Not Haz.	Haz.	
1. Exposure to Weather	X					
2. Extreme Cold	X					
3. Extreme Heat	X					
④ Wet and/or Humid				X		4. Contact with water and wet rings when tending ultrasonic cleaner and hydrofinish machine.
5. Noise	X					
6. Vibration	X					
7. Atmospheric Conditions	X					
Inherent Hazards						
8. Moving Mechanical Parts	X	■		■		
9. Electric Shock	X	■		■		
10. High, Exposed Places	X	■		■		
11. Radiant Energy	X	■		■		
12. Explosives	X	■		■		
13. Toxic or Caustic Chem.	X	■		■		
14. Other:	X	■		■		

Protective Clothing and Devices

none
(Gloves are part of and connected to hydrofinish machine)

RATINGS ESTIMATE SHEET

Page 8 of 8

ID No. 412-300-1510-5

Estab. Job Title Caster

1. WORK PERFORMED ESTIMATES:

a. Worker Functions Data 6 People 8 [✓ Things] 5

b. Work Fields 132 Casting; 051 Abrading; 031 Cleaning

c. MPSMS 544 Nonferrous Metals, Rolled, Drawn, and Extruded; 611 Jewelry, Precious Metal

d. OGA Code and Title 502 Melting, Pouring, Casting, and Related Occupations

2. WORKER CHARACTERISTICS ESTIMATES:

a. GED Reasoning 2 Math 1 Language 1

b. Job Training Time 2 D W [✓ M] (SVP 3)

c. Aptitudes	G	V	N	S	P	Q	K	F	M	E	C
Level	4	4	5	4	3	4	4	4	3	X	4
Task No.					3/4		S				

d. Interests 01 02 03 04 05 [✓ 06] 07 08 09 10 11 12

e. Temperaments D [✓ R] I V E A S [✓ T] [✓ U] P J

3. KEYWORDS:

a. Occupational Unit 21 Machining/Machine Operating

b. Core Keyword(s) 59295 Machine Tending

c. Additional Keywords 23183 Casting Machines and Equipment; 54473 Buffing and Polishing Mach.; 18413 Sandblasting Process; 22707 Material Clean Mach and Equip.; 54491 Handtools; 05733 Jewelry and Flatware; 26648 Manufacturing Plants; Suggested new Complementary Terms: Ultrasonic Cleaning Equipment (BHFBA); Gold Rings (AJCCD)

Analyst James Bennington Date 9/4/81

Field Center Reviewer Elizabeth McCarthy Date 9/11/81

Establishment Reviewer Robert Bradley Title Foreman, Casting Room Date 9/18/81

CHAPTER 18

NARRATIVE REPORT

Page

Outline for the Narrative Report 413

Use of the Outline for the Narrative Report 415

CHAPTER 18

NARRATIVE REPORT

During the course of an establishment study, information is obtained that cannot be properly presented in Job Analysis Reports. The Narrative Report provides an organized format for recording all relevant data about the establishment, its jobs, and the industry to which it belongs. This data is useful in preparing industry and career-information brochures. Since these publications are based on many narrative reports from various segments of the industry (as well as on data from other sources), it is important that the reports contain similar categories of data presented uniformly to facilitate their use for this purpose.

The extent of the data collected by an analyst at an establishment will vary according to the type of establishment, the nature of the industry, and the study restrictions, (such as time constraints and limited access to certain jobs or categories of information); therefore, the analyst should exercise some flexibility in following the Outline for the Narrative Report. However, when an outline topic is relevant to the establishment studied, a reasonable attempt should be made to gather information for coverage of that topic.

Outline for the Narrative Report

I. Background of Study

A. Purpose and scope of the study, such as for test development, job restructuring, industry study, etc; and involving a group of jobs, all jobs within the industry, new jobs only (not in DOT), or all jobs at the establishment.

B. Restrictions imposed by the establishment that limits the study.

II. Organization of Establishment

A. Organization charts, prepared in accordance with concepts and procedures covered in Chapter 4.

B. Total number of employees, number of departments, and number of departments directly involved in production or services of the establishment.

C. Description of products or services.

D. Description of segment of industry of which the establishment is a part.

E. Comparison of establishment's size (number of employees) with similar establishments in the industry.

F. Locations of other establishments within the corporate organization.

III. Operations

A. Workflow charts (prepared in accordance with procedures in Chapter 5) and, for each chart, an Explanation of Workflow Chart (see pp. 430-431).

B. Seasonality of work and its effects on operations and on use of the establishment's work force.

C. Work shifts.

D. Changes in processes, work methods, and technologies, especially those introduced within the past decade, and their effect on such factors as productivity and hiring practices.

IV. Personnel Practices and Policies

A. Hiring requirements, such as educational level, experience, and special licensing and certification.

B. Types and duration of training provided, such as apprenticeship programs, inplant classroom and on-the-job training programs, and programs for upgrading workers.

C. Promotional and transfer opportunities.

D. Union affiliations.

Optional Sections:

V. Outlook for the Future

A broad-range picture in terms of anticipated changes in processes, work methods, technologies, and types of products or services, and the effects on employment opportunities. Projections should extend through as many years as possible.

VI. Miscellaneous

Any topic, not covered in previous sections, which contributes to a better understanding of the establishment and its industry.

VII. Glossary

An alphabetical listing of industry terms and their definitions, based on technical terms for processes, work devices, materials, and products used in the establishment.

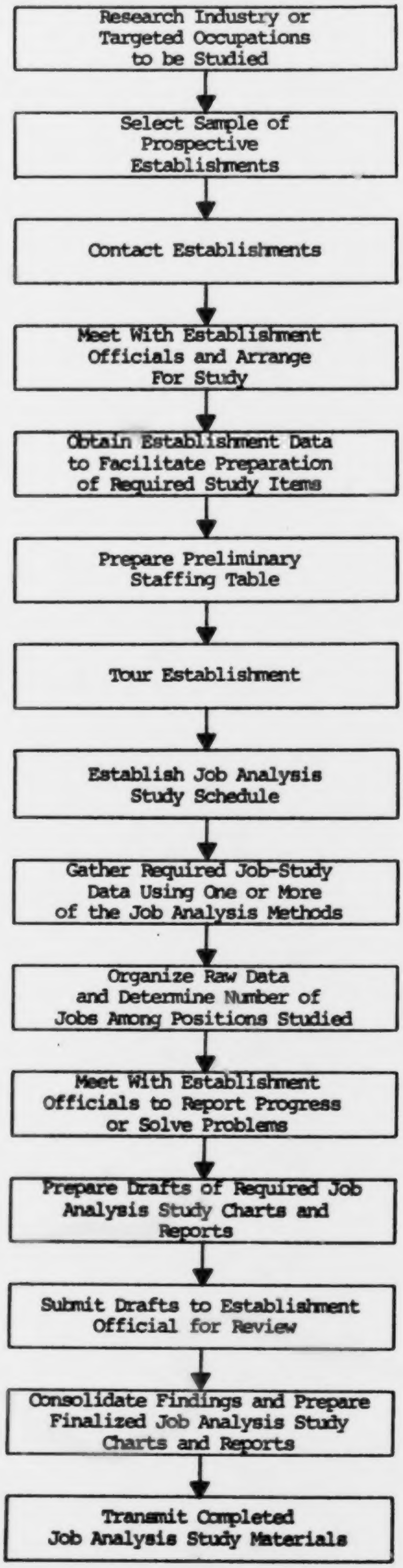
Use of the Outline for the Narrative Report

Organize the Narrative Report according to the outline shown, with the major captions of the sections corresponding with those in the outline. The subtopics covered under each section should also be organized and lettered as in the outline, but their treatment will depend upon the data collected by the analyst and the importance or relevance of the topic to the establishment or industry. If a subtopic does not apply or if no data is available for coverage of that topic, a positive entry must be made after the letter designation, such as "not applicable" or "data not available." Additional subtopics may be added to each section of the report, as appropriate, and should be lettered consecutively. Additional major headings may also be added to the Narrative Report for Optional Sections V through VII. The glossary of technical terms may be warranted if the analyst feels that a significant number of terms, work devices, materials, and products, as defined in the Job Analysis Reports, represent standard terminology used primarily or exclusively in the industry or segment of the industry studied. Such glossaries need not be comprehensive because they will be consolidated with glossaries from other Narrative Reports for possible use in industry brochures.

APPENDIXES

APPENDIX A

JOB ANALYSIS STUDY FLOWCHART


Research Industry or Targeted Occupations to be Studied
Select Sample of Prospective Establishments
Contact Establishments
Meet With Establishment Officials and Arrange For Study
Obtain Establishment Data to Facilitate Preparation of Required Study Items
Prepare Preliminary Staffing Table
Tour Establishment
Establish Job Analysis Study Schedule
Gather Required Job-Study Data Using One or More of the Job Analysis Methods
Organize Raw Data and Determine Number of Jobs Among Positions Studied
Meet With Establishment Officials to Report Progress or Solve Problems
Prepare Drafts of Required Job Analysis Study Charts and Reports
Submit Drafts to Establishment Official for Review
Consolidate Findings and Prepare Finalized Job Analysis Study Charts and Reports
Transmit Completed Job Analysis Study Materials

APPENDIX B

TASK ANALYSIS FROM A JOB RESTRUCTURING STUDY

STAFF PHYSICAL THERAPIST (Consolidated) Findings

TASK SUMMARY:

Administers programs of therapeutic exercise.

No.	Time %	GED	Worker Functions			Temperaments	Interests	Aptitudes											P. D.	E. C.
			D	P	T			G	V	N	S	P	Q	K	F	M	E	C	L	
4	30%	5	1	2	1	D, I, J, M, P	10, 02	2	3	3	2	2	3	2	2	2	4	4	3,4,5,6	I

TASK DESCRIPTION:

Instructs, motivates, and assists patients in, or administers without patient assistance, various manual therapeutic exercises, guiding and moving patient's body parts in selective patterns of body posture and movement to improve patient's neuromuscular response, improve functions of other body systems, relieve pain and discomfort, and/or prepare for training in daily living activities. Adapts, integrates, and applies individualized combinations of established therapeutic exercise methods, applying precise amounts of manual assistive and resistive force at specific body points, incorporating sensory stimuli, such as cold, touch, chemical agents, and sound, and/or positioning patient in manner to facilitate desired movements by inducing selected reflex actions and inhibiting undesired movements, so that patient can develop or regain ability to perform goal-directed functional movements. Adapts or devises new exercise techniques and/or varies and adjusts resistive and assistive forces, range of motion, and frequency, duration, and mode of application based on continuous observation and evaluation of patient's immediate responses to exercise and progress in program. Instructs, motivates, directs and/or assists patients in nonmanual exercises, such as active regimens, isometric, and progressive-resistive exercises (with weights and exercise equipment), monitoring patient progress and frequently delegating immediate patient supervision to subordinate staff member, according to condition and progress of specific patient. Occasionally administers manual exercise to patients in hydrotherapy tank, using water as a resistive force, its buoyancy to facilitate movement, and its motion and warmth to relax muscles, increase blood circulation, and/or reduce pain.

KNOWLEDGES, SKILLS AND ABILITIES:

Knowledge of neurological development; theories of motor learning, motor development, and motor behavior; methods of instruction; anatomy; physiology; physics, psychology, and basic medical sciences; kinesiology including principles of power, force, and indurance; methods of therapeutic exercise (e.g., Bobaths, Brunnstrom, Fay, Rood, and Kabat) including neuromuscular-facilitation and positioning techniques; reflex pathways that affect motor performance; physiological and psychological effects of therapeutic exercise; functional patterns inherent in normal motion; implications of perceptual difficulties; skill in application of exercise procedures and in use and adaption of exercise equipment; ability to communicate with patient at his level and to motivate patient; ability to identify, interpret, and react to patient's immediate reactions to exercise therapy and to recognize muscular tension, spasticity, clonus, and flaccidity; ability to correlate principles of therapeutic exercise with basic sciences. Ability to integrate and apply knowledges pertinent to specific patient-treatment problems is important in exercise therapy.

COMMENTS:

The ability to skillfully administer appropriate manual exercises using the most beneficial methods and techniques for each patient is an extremely important part of the Physical Therapist's job. Methods and techniques of facilitating and inhibiting motor response have become increasingly important in recent years and require skills, knowledges, and abilities of a greater depth and scope than in previous decades.

APPENDIX C

EXAMPLES OF THE FOUR PARTS OF A JOB DESCRIPTION

Job Identification

Job Title Tool Designer

Number employed 4

Alternate titles Tool Designer I
Tool Designer II

Date March 10, 1979

Department Tool Design

Industry Construction Machinery Manufacturer
Concrete Mixers, Conveyor Equipment

Job Summary

Designs special tools, dies, jigs, and fixtures for use on all types of production machines.

Body

1. Studies tooling problem to determine basic part and machine specifications governing design of tool: Reads Tool Order, examines blueprint of finished part, and analyzes Sequence of Operations Sheet to determine machining operations required of new tool. Studies part and part blank and computes dimensions of part or parts before and after machine operation for which tool design is required. Sketches part in relationship to tool as guide to tool design. Examines machine for which tool is to be made and confers with CHIEF TOOL DESIGNER to gather information to make decisions relative to designing the tool needed to perform necessary machining operations. Draws sketches of machine and part incorporating basic decisions made, including dimensions, clearances, and tolerances. (25%)

2. Designs tools: Develops form and shape of tool by studying tool design drawing of other similar tools, by comparing own ideas of tool's design with accumulated part and machine specifications, and by drawing rough and semidetailed sketches. Calculates final detail dimensions, clearances, and tolerances of tool, using Design Reference Book, machinists' handbook, mechanical engineers' handbook, trigonometry, slide rule, and standard formulas. Draws general assembly drawings of complete tool, showing top, front, and side views, tool, machine, and part in actual use, and all dimensions, tolerances, and clearances. (30%)

3. Writes tool specifications covering materials and processes: Selects commercial tool items for purchase from vendors, considering part machined, tolerances, and allowances of tool and part, speed of machine, tool coolants used, estimated tool life, and cost in relation to specifications desired. Selects type of material, such as tool steel, to use in fabricating tool, using same criteria in selecting material as purchased part. Determines fabrication or construction specifications. (15%)

4. Assigns general assembly drawing to DESIGN DRAFTER for preparation of detail drawing of tool parts, advises DESIGN DRAFTER concerning drafting techniques and procedures, and reviews completed detail drawings. (10%)

5. Advises TOOLMAKER on problems, such as sizes, tolerances, clearances, material selection, and other problems encountered in fabricating and assembling tool. (10%)

6. Redesigns tools which fail to meet machining requirements. (10%)

Job Requirements

Experience: None **Acceptable:** DESIGN DRAFTER

Training data: Minimum training time ---- (a) Inexperienced workers. ______

(b) Experienced workers. 6 months

TRAINING	SPECIFIC JOB SKILLS ACQUIRED THROUGH TRAINING
Inplant and on-the-job training: TOOL DESIGNER APPRENTICE	Fundamental principles of tool designing. Experience designing tools. Calculating dimensions and reading blueprints and specifications. Knowledge of algebra and other mathematics that are helpful in computations.
Vocational training: Technical school or vocational school. Course must include algebra, geometry, trigonometry, mechanical drawing, machine shop practice, and shop mathematics.	

Apprenticeship: Formal X Informal ______ **Length required:** 5 years DESIGN DRAFTER

Relation to other jobs:

(a) Promotions from and to, transfers, etc.: From DETAILER or DESIGN DRAFTER; promotion to GROUP LEADER.

(b) Supervision received: General X Close ______ By: CHIEF TOOL DESIGNER (Title)

(c) Supervision given: None ______ Number supervised 1 Titles: DESIGN DRAFTER

Responsibility

Responsible for proper and efficient design of tools, drill jigs, and turning fixtures; grinding fixtures for surface grinders and cylindrical grinders; and blanking, piercing, and forming dies and gages. Responsible for the correct dimensions and calculation of tools, jigs, fixtures, dies, and gages. Responsible for assigning assembly drawings to DESIGN DRAFTERS and for verifying that completed drawings comply with specifications and blueprints.

Job Knowledge

Must have knowledge of shop mathematics and drafting techniques. Must be able to read and understand blueprints. Must be able to use micrometers, verniers, height and depth gages, and calipers. Must have knowledge of tool design, toolmaking methods, and machining and other properties of metals.

Mental Application

Must be able to develop new ideas in tool design and to adapt existing designs. Must be alert and able to concentrate on fine detail. Must be able to exercise independent judgment, and confer with others to resolve problems. Must exercise initiative in solving design problems.

Dexterity and Accuracy

Must be accurate in making calculations and in designing tools that meet very fine specifications, often to within .0001 of an inch. Must be able to read instructions, specifications, and various measuring instruments with absolute accuracy.

General Comments

In general, the TOOL DESIGNERS develop all types of tools for various production machines used in the factory. The TOOL DESIGNERS are not recognized as specialists in such areas as tool or cutter design, jig or fixture design, or die design, although some have more talent, interest, and experience in some of these special areas, and the supervisor routes such jobs to them. At times two or more TOOL DESIGNERS will work on one tool order, each designing one particular tool of the many making up the tool order.

Vocational school graduates and technical high school graduates who have training in algebra, geometry, trigonometry, mechanical drawing, machine shop practice, and shop mathematics can be trained on the job to become TOOL DESIGNERS so that MECHANICAL ENGINEERS can utilize the fuller scope of their training on machine design or in a supervisory or advisory capacity on design activities.

PHYSICAL ACTIVITIES

1 X Walking
2 O Jumping
3 O Running
4 O Balancing
5 O Climbing
6 O Crawling
7 X Standing
8 O Turning
9 O Stooping
10 O Crouching
11 O Kneeling
12 X Sitting
13 O Reaching
14 X Lifting
15 X Carrying

16 O Throwing
17 O Pushing
18 O Pulling
19 X Handling
20 X Fingering
21 O Feeling
22 X Talking
23 X Hearing
24 X Seeing
25 O Color vision
26 O Depth perception
27 O Working speed
28 ____
29 ____
30 ____

WORKING CONDITIONS

51 X Inside
52 O Outside
53 O Hot
54 O Cold
55 O Sudden temp. changes
56 O Humid
57 O Dry
58 O Wet
59 O Dusty
60 O Dirty
61 O Odors
62 O Noisy
63 X Adequate lighting
64 X Adequate ventilation
65 O Vibration

66 O Mechanical hazards
67 O Moving objects
68 O Cramped quarters
69 O High places
70 O Exposure to burns
71 O Electrical hazards
72 O Explosives
73 O Radiant energy
74 O Toxic conditions
75 X Working with others
76 X Working around others
77 O Working alone
78 ____
79 ____
80 ____

Details of Physical Activites

Sits (90%). Reaches for blueprints, specifications, and designing equipment. Reads blueprints and makes calculations. Stands and walks 10% to and from other personnel to assign work or to confer with them.

Details of Working Conditions

Inside (100%). Works in constant contact with others in adequately lighted and ventilated room.

Details of Hazards

None.

APPENDIX D

EXAMPLES OF JOB DESCRIPTIONS

The job descriptions in this Appendix illustrate a variety of formats developed for different purposes.

Occupational Definition, *Dictionary of Occupational Titles*, Fourth Edition, U.S. Employment and Training Administration .... p. 426

Job Description, Bank Administration Institute .... p. 427

Specific Aptitude Test Battery (SATB) Fact Sheet, U.S. Employment and Training Administration .... p. 428

Occupational Code Request (page 1), U.S. Employment and Training Administration .... p. 429

Occupational Definition

166.267-018 JOB ANALYST (profess. & kin.) personnel analyst.

Collects, analyzes, and prepares occupational information to facilitate personnel, administration, and management functions of organization: Consults with management to determine type, scope, and purpose of study. Studies current organizational occupational data and compiles distribution reports, organization and flow charts, and other background information required for study. Observes jobs and interviews workers and supervisory personnel to determine job and worker requirements. Analyzes occupational data, such as physical, mental, and training requirements of jobs and workers and develops written summaries, such as job descriptions, job specifications, and lines of career movement. Utilizes developed occupational data to evaluate or improve methods and techniques for recruiting, selecting, promoting, evaluating, and training workers, and administration of related personnel programs. May specialize in classifying positions according to regulated guidelines to meet classification requirements of civil service system and be known as POSITION CLASSIFIER (gov. ser.)

Job Description

Job Title: Commercial Loan Officer **Department:** Commercial Loan

Organizational Relationships

Reports to: Senior Loan Officer
Supervises: 1 Secretary (supervision may be shared)

General Function

Develops and manages commercial loan accounts which meet established lending requirements and which provide maximum profitability to bank with minimum of risk.

Major Duties and Responsibilities

1. Interviews loan applicants and collects and analyzes financial and related data in order to determine general credit worthiness of prospect and merits of specific loan request.
2. Establishes, and negotiates where necessary, terms under which credit will be extended, including costs, repayment method, and schedule and collateral requirements.
3. Approves Class II loans up to $50,000 and serves as Contact Officer on loans above this limit. In general, handles more complex and substantial loans of Department.
4. Collects and analyzes information which reflects current credit worthiness of customers and current merits of existing loans. Information may be obtained by direct inspection of applicant's business and or collateral, review of interim financial reports, personal interview, etc.
5. Monitors loan repayment activities and takes necessary action to collect from past-due accounts.
6. Advises customers on business management and financial matters.
7. Develops new business by contacting prospects and customers. Also cross-sells Bank services.
8. Serves as member of Loan Committee which makes preliminary evaluations of loan requests.
9. Develops material for and makes loan presentations to Executive Committee.
10. Participates in community affairs to increase Bank's visibility and to enhance new business opportunities.
11. Serves as contact officer for nonborrowing accounts and loan customers for matters relating to other Bank services.
12. Counsels with and assists in training and development of Commercial Loan Officers, Levels II and III.
13. Undertakes special projects relating to departmental services as assigned by Senior Loan Officer.

SATB JOB DUTY FACT SHEET

Page 1 of 1

Date 1/17/78

ANALYST Charles Bellows

DOT TITLE AND CODE Circular Knitter 685.665-014

SATB NO. S-336

PLANT TITLE Knitter

COMPANY NAME AND CODE XYZ Mills

ADDRESS 75 Main Street, Albany, New York 11201

JOB SUMMARY: Tends battery of knitting machines with needles arranged in circle to knit in tubular form from yarn.

Critical Job Duties	JOB DUTIES	Frequency of Performance	Percentage of Time Spent	Important or Critical Aptitude(s)
•	Reads work ticket to determine quantity, style, and size cloth to be knitted, and color and type yarn required.	approx. 10 times per 8-hr. shift	5%	Q
•	Places full cones of yarn of specified color on cone stand and ties end of yarn from cone to yarn in machine with knot, or threads yarn through yarn guides, tension disc, and stop-motion device, using fingers or hook. Observes knitting process to detect yarn breaks, exhausted yarn cones, defects in cloth, and machine malfunction.	approx. 225 times per 8-hr. shift	70%	M, F, K, P
	Starts machine and laps end of knitted cloth around take-up roller. Pulls separator thread or cuts cloth with scissors to remove cloth from machine. Notifies supervisor or mechanic if machine malfunctions.	approx. 5 times per 8-hr. shift	10%	M
	Ties knot to repair yarn breaks and trims tail of yarn with scissors.	approx. 20 times per 8-hr. shift	5%	F, M
	Repositions cloth on needle line when cloth has been cast off.	approx. 6 times per week	5%	M
	Cleans lint and dust from machine, using airhose. Lubricates machine, using oilcan.	approx. 5 times per 8-hr. shift	5%	M

Occupational Code Request

U.S. DEPARTMENT OF LABOR
Employment and Training Administration

OCCUPATIONAL CODE REQUEST

DATE RECEIVED BY OAFC ➤ ➤ January 12, 1979

A. ORIGINATING OFFICE

1. State: New York

2. Date Transmitted: 1-12-79 (tele.)

3. Local Office *(Name, LO No., Address, Phone No.)*
Job Service Division
L.O. 850
242 Andrews Street
Rochester, New York 14604

4. Requested By *(Name, Title, Phone No.)*
J. Rosa, Occupational Analyst
Rochester District, New York

B. INFORMATION OBTAINED FROM:

1. CHECK APPROPRIATE BOX
☒ Employer ☐ Applicant ☐ Training Program
☐ Other *(specify)* ....

2. Establishment *(Name and Address)*
ADP Services, Inc.
20 Oak Street
Rochester, New York 14604

3. Establishment Contact *(Name, Title, Phone No.)*
Mr. J. Wilson, Personnel Officer
(716) 123-4567

4. Product(s)/Service(s): Data Processing

5. SIC Code (4 digits): 7374

C. JOB DESCRIPTION *(Instructions on Reverse Side)*

1. Establishment Job Title(s)

Sales Representative

2. List Overall Purpose or Summary of this Job

Contacts representatives of government, business, and industrial organizations to solicit business for data-processing establishment.

3. List Important or Regularly Performed Tasks:

Calls on prospective clients to explain data-processing services provided by establishment, such as inventory control and payroll processing, data conversion, sales analysis, or financial reporting. Analyzes data-processing requirements of prospective client and draws up prospectus of data-processing plan designed to serve client's needs. Consults SYSTEMS ANALYST, ELECTRONIC DATA PROCESSING, and SYSTEMS ENGINEER, ELECTRONIC DATA PROCESSING, employed by data-processing establishment to secure information concerning methodology for solving unusual problems. Quotes prices for services outlined in prospectus. Revises or expands prospectus to meet client's needs. Writes order and schedules initiation of services. Periodically confers with clients and establishment personnel to verify satisfaction with service or to resolve complaints.

4. (a) List Employer's Hiring Requirements: *(education, vocational training, experience, other)*

Bachelor's degree in the related fields of business, accounting, or economics. In some cases, a mathematics or physics education is required. The training period is one year minimum. A background in systems analysis or programing is preferred.

4. (b) List Machines, Tools, Equipment or Work Aids the Worker Uses To Perform Duties:

Manuals and technical papers

D. APPROVED TITLE AND CODE:

OCCUPATIONAL TITLE: SALES REPRESENTATIVE, DATA-PROCESSING SERV.

INDUSTRY ➤ bus. ser.

OCCUPATIONAL CODE (9 digits): 259.157-600

GOE CODE (6 digits) ➤ 08.01.02

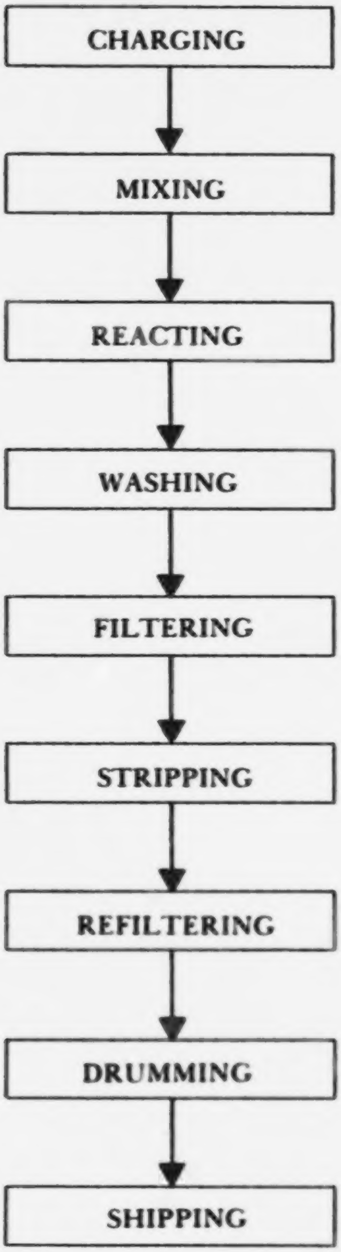
SEND ORIGINAL COPY TO RESPONSIBLE OAFC

ETA 741 (Jan. 1979)

APPENDIX E

WORKFLOW CHART AND EXPLANATION OF WORKFLOW CHART

Establishment No. 352-845-1172
Insecticide Unit
June, 1977


CHARGING
MIXING
REACTING
WASHING
FILTERING
STRIPPING
REFILTERING
DRUMMING
SHIPPING

Explanation of Workflow Chart
Establishment No. 352-845-1172
Insecticide-Production Unit

CHARGING

Kettles are charged with liquid and powdered chemicals. Bags of powdered chemicals are transported to unit work area by Material Handler (352-845-1172-5). Liquid chemicals are stored in holding tanks. The Kettle Operator (352-845-1172-2) charges the kettle with liquid chemicals through controls on a control panel, and carries bags of powdered chemicals to the kettle, slits bags, and dumps contents into kettle chute.

MIXING

Liquid and powdered chemicals and water are mixed thoroughly by action of agitator in kettle, and mixture is maintained at prescribed temperature. At end of specified mixing-time cycle, the batch is pumped to the reactor by Kettle Operator.

REACTING

Additional chemicals are added to the batch in the reactor, temperature is regulated at specified levels, and reaction is permitted to run its time cycle before the Kettle Operator transfers the batch to the wash tank.

WASHING

Additives are mixed with the batch in the wash tank and heat is maintained at required levels. The mixture is allowed to settle for a designated period. The bottom layer in wash tank is then pumped to the filtering tank. Performed by Wash Operator (352-845-1172-3).

FILTERING

The washed batch is circulated within the filtering tank through circular filters as additives are added. The filtering process continues until impurities are removed, after which the Wash Operator pumps the batch to the stripping tank.

STRIPPING

The washed and filtered batch is heated and distilled at a specified rate by Batch Stripper (352-845-1172-4).

REFILTERING

The product undergoes a final filtering process to assure that all impurities are removed. Performed by Material Handler.

DRUMMING

The Material Handler fills 55-gallon metal drums with the final product, stencils the drums with identifying data, and transports the filled drums to the shipping area, using forklift truck.

SHIPPING

The drums of insecticide are palletized and shipped to customers by truck, rail, or water.

BIBLIOGRAPHY

BIBLIOGRAPHY

Allen, J. C., "Multidimensional Analysis of Worker-Oriented and Job-Oriented Verbs," *Journal of Applied Psychology*, Vol. 53, 1969, pp. 73-79.

Allen, Louis A., *Charting the Company Organization Structure*, National Industrial Conference Board, Studies in Personnel Policy, No. 168, 1959.

Allen, L., "Test Transportability and the Uniform Guidelines," *Public Personnel Management*, Vol. 8, No. 2, 1979, pp. 309-314.

American Management Association, *Basic Steps in Job Analysis and Job Descriptions*, 1968.

American Management Association, *Glossary of Terms Used in Job Descriptions*, 1968.

American Management Association, *How To Make A Job Breakdown*,March 1960.

American Management Association, *Organizing for Effective Production Planning and Control*, A.M.A. Management Bulletin No. 5, 1960.

American Psychological Association, American Educational Research Association, and National Council on Measurement in Education, *Standards for Educational and Psychological Tests*, American Psychological Association, Washington, D.C., 1974.

American Psychological Association, Division of Industrial-Organizational Psychology, *Principles for the Validation and Use of Personnel Selection Procedures*, 2nd ed., Berkeley, California, 1980.

Archer, J. R. and Giorgia, M. J., *Bibliography of the Occupational Research Division*, Air Force Human Resources Laboratory. JSAS *Catalog of Selected Documents in Psychology*, Vol. 5, (Ms. No. 974), 1977.

Archer, Wayne B., *Computation of Group Job Descriptions for Occupational Survey Data*, Technical Report No. 66-12, December 1966, Personnel Research Laboratory, Aerospace Medical Division, Air Force Systems Command, Lackland Air Force Base, Texas.

Arvey, R. D. and Begalla, M. E., "Analyzing the Homemaker Job Using the Position Analysis Questionnaire," *Journal of Applied Psychology*, Vol. 60, 1975, pp. 513-517.

Arvey, R. D.; Maxwell, S. E.; and Mossholder, K. M., "Even More Ideas About Methodologies for Determining Job Differences and Similarities," *Personnel Psychology*, Vol. 32, No. 3, 1979, pp. 529-538.

Arvey, R. D. and Mossholder, K. M., "A Proposed Methodology for Determining Similarities and Differences Among Jobs," *Personnel Psychology*, Vol. 30, No. 3, 1977, pp. 363-374.

Arvey, R. D.; Passino, E. M.; and Lounsbury, J. N., "Job Analysis Results as Influenced by Sex of Incumbent and Sex of Analyst," *Journal of Applied Psychology*, Vol. 62, 1977, pp. 411-416.

Ash, R. A., *Job Elements for Task Clusters: Arguments for Using Multi-Methodological Approaches to Job Analysis and a Demonstration of Their Utility*, Paper Presented at the Annual Conference of the International Personnel Management Association Assessment Council.

Ash, R. A., "Review of the Critical Incident Technique," In *Human Resources in Criminal Justice: Volume II. Critiques of Job Analysis Methods*, University of South Florida, Human Resources Institute, Center for Evaluation Research, Tampa, Florida, June 1980, pp. 89-105.

Ash, R. A. and Edgell, S. L., "A Note on the Readability of the Position Analysis Questionnaire (PAQ)," *Journal of Applied Psychology*, Vol. 60, 1975, pp. 765-766.

Ash, R. A. and Levine, E. L., "A Framework for Evaluating Job Analysis Methods," *Personnel*, Vol. 57, 1980, pp. 53-59.

Ash, R. A. and Levine, E. L., "Utilization and Choice of Job Analysis Methods," In *Human Resources in Criminal Justice: Volume II. Critiques of Job Analysis Methods*, University of South Florida, Human Resources Institute, Center for Evaluation Research, Tampa, Florida, June 1980, pp. 5-24.

Ash, R. A. and Levine, E. L., "Review of the Position Analysis Questionnaire," In *Human Resources in Criminal Justice: Volume II. Critiques of Job Analysis Methods*, University of South Florida, Human Resources Institute, Center for Evaluation Research, Tampa, Florida, June 1980, pp. 107-124.

Augustin, J. W.; Cunningham, J. W.; and Heath, W. D., *Affective Correlates of Systematically Derived Occupational Variables: A Repeated Study*, Ergometric Research and Development Series, Report No. 12, School of Education, North Carolina State University, Raleigh, 1975.

Austin, David L., "A New Approach to Position Descriptions," *Personnel Journal*, July 1977, pp. 354-366.

Avery, Lillian, *Development of a USES Interest Inventory*, Paper presented at Occupational Analysis Field Center Supervisors Conference, Los Angeles, California, May 1978.

Avery, Lillian, *USES Occupational Interest Areas and Their Relationship to Holland's Occupational Categories*, Exhibit presented at Occupational Analysis Field Center Supervisors Conference, Los Angeles, California, May 1978.

Baehr, M. E., *Skills and Attributes Inventory*, The University of Chicago, Industrial Relations Center, Chicago, Illinois, 1971.

Baehr, M. E., *A National Occupational Analysis of the School Principalship*, The University of Chicago, Industrial Relations Center, Chicago, Illinois, 1975.

Baehr, M. E., *National Validation of a Selection Test Battery for Male Transit Bus Operators: Final Report*, National Technical Information Service, Springfield, Virginia, June 1976.

Baehr, M. E., *A Practitioner's View of EEOC Requirements with Special Reference to Job Analysis*, The University of Chicago, Industrial Relations Center, Occasional Paper 37, Chicago, Illinois, September 1976.

Baehr, M. E.; Burns, F. M.; McPherson, R. B.; and Salley, C., *Job Functions Inventory for School Principals*, The University of Chicago, Industrial Relations Center and Consortium for Educational Leadership, Chicago, Illinois, 1976.

Bakke, Robert L.; Demarre, Dean A.; Goldman, Donald B.; and Ullery, J. William, *Task Analysis by Selected Criteria: A Manual* (For the Field of Biomedical Equipment Technology), Interim Report III, Technical Education Research Centers, Cambridge, Mass., March 1972.

Bank Administration Institute, *Job Descriptions for Bank Personnel*, Park Ridge, Illinois, 1975.

Barlow, Esther, *Abstracts of Personnel Research Reports*, VII, Personnel Research Laboratory, Aerospace Medical Division, Air Force Systems Command, Lackland Air Force Base, Texas, 1966.

Barrett, G. V.; Alexander, R. A.; O'Connor, E. O.; Forbes, J. B.; Balascoe, L.; and Garver, T., *Public Policy and Personnel Selection: Development of a Selection Program for Patrol Officers*, University of Akron, Department of Psychology, Technical Report 1, Akron, Ohio, April 1975.

Bates, M. W. and Vail, R. G., "Job Evaluation and Equal Employment Opportunity: A Tool for Compliance - A Weapon for Defense," *Employee Relations Law Journal*, Vol. 1, No. 4, 1976, pp. 535-546.

Baxter, B., *Replacing Jobs with Task Clusters as the Work Unit for Test Validation*, American Institutes for Research (DLMA 20-42-74-14-1), Pittsburgh, Pennsylvania, September 1975.

Baxter, Brent, "Validation of the Basic Occupational Literacy Test," Prepared for U.S. Department of Labor by American Institutes for Research under Contract No. 20-42-74-14, 1975.

Begeman, Myron L. and Amstead, B. H., *Manufacturing Processes, 6th ed., John Wiley and Sons, Inc., New York, 1969.*

Belcher, D. W., *Compensation Administration*, Prentice-Hall, Englewood Cliffs, New Jersey, 1974.

Bennett, C. A., "Toward Empirical, Practicable, Comprehensive Task Taxonomy," *Human Factors*, Vol. 13, No. 3, 1971, pp. 229-235.

Berwitz, Clement J., *The Job Analysis Approach to Affirmative Action*, Wiley-Interscience, John Wiley & Sons, New York, 1975.

Biddle, R. E., *Brief GOJA: A Two Hour Job Analysis*, Biddle and Associates, Inc., Sacramento, California, 1977.

Blashfield, R. K., "Mixture Model Tests of Cluster Analysis: Accuracy of Four Agglomerative Hierarchical Methods," Psychological Bulletin, Vol. 83, 1976, pp. 377-388.

Blum, Albert A., *Company Organization of Insurance Management*, American Management Association, Research Study No. 49, 1961.

Blumrosen, R. G., "Wage Discrimination, Job Segregation, and Title VII of the Civil Rights Act of 1964," *University of Michigan Journal of Law Reform*, Vol. 12, No. 3, 1979, pp. 397-502.

Blumrosen, R. G., "Wage Discrimination, Job Segregation, and Women Workers," *Employee Relations Law Journal*, Vol. 6, No. 1, 1980, pp. 77-136.

Boese, R. R. and Cunningham, J. W., *Systematically Derived Dimensions of Human Work*, Ergometric Research and Development Series, Report No. 14, School of Education, North Carolina State University at Raleigh, 1975.

Boling, Jewell and Fine, Sidney, "Cues Used by Raters in the Rating of Temperament Requirements of Jobs," *Journal of Applied Psychology*, Vol. 43, 1959, pp. 102-108.

Borgen, Fred H. et al., *Occupational Reinforcer Patterns*, Minnesota Studies in Vocational Rehabilitation: XXIV, Bulletin 48, Industrial Relations Center, University of Minnesota, Minneapolis, October 1968.

Borgen, Fred H. et al., *The Measurement of Occupational Reinforcer Patterns*. Minnesota Studies in Vocational Rehabilitation: XXV, Bulletin 49, Industrial Relations Center, University of Minnesota, Minneapolis, October 1968.

Borgen, F. H. and Weiss, D. J., "Cluster Analysis in Counseling Research," *Journal of Counseling Psychology*, Vol. 18, 1971, 583-591.

Borman, W. C.; Toquam, J. L.; and Rosse, R. L., *Dimensions of The Army Recruiter and Guidance Counselor Job*, U.S. Army Technical Report, March 1977, No. TR-77-A5. JSAS *Catalog of Selected Documents in Psychology*, Vol. 9. (Ms. No. 1953), 1979.

Borow, Henry (ed.), *Man in a World of Work*, Houghton Mifflin Co., Boston, 1964.

Bouchard, T. J., *A Manual for Job Analysis*, Minnesota Civil Service Department, St. Paul, Minnesota, 1972.

Bownas, D. A., *Plant Operator Task List*, Personnel Decisions Research Institute, Minneapolis, Minnesota, 1979.

Bownas, D. A. and Bosshardt, M. J., *Development of Task Inventories for Three Coast Guard Rates*, Project Final Report, Personnel Decisions Research Institute, Minneapolis, Minnesota, 1979.

Bownas, D. A. and Heckman, R. W., *Job Analysis of the Entry Level Firefighting Position*, Personnel Decisions, Inc., Minneapolis, Minnesota, 1976.

Braaten, T. A., *The Analysis of Physical Abilities and the Development of Physical Fitness Measurements to Aid in the Selection of Police Applicants for the City of Saginaw Police Department*, Saginaw Police Department, Saginaw, Michigan, 1975.

Brief, A. P. and Aldag, R. J., "Employee Reactions to Job Characteristics: A Constructive Replication," *Journal of Applied Psychology*, Vol. 60, 1975, pp. 182-186.

Brief, A. P. and Aldag, R. J., "Correlates of Role Indices," *Journal of Applied Psychology*, Vol. 61, No. 4, 1976, pp. 468-472.

Brinkerhoff, D. W. and Kanter, R. M., "Appraising the Performance of Performance Appraisal," *Sloan Management Review*, Vol. 21, No. 3, 1980, pp. 3-16.

Britton, Donald E., "Are Job Descriptions Really Necessary?" *Management Review*, January 1975.

Broom, Leonard et. al., "Worker Traits and Worker Functions in DOT," *Journal of Vocational Behavior*, II, 1977, pp. 253-261.

Brown, W. P., "Local Policing: A Three Dimensional Task Analysis," *Journal of Criminal Justice*, Vol. 3, No. 1, 1975, pp. 1-16.

Brumback, G. B., "Consolidating Job Descriptions, Performance Appraisals, and Manpower Reports," *Personnel Journal*, Vol. 50, 1971, pp. 604-610

Brumback, G. B., *One Method is Not Enough: An Overview of Selection Oriented Job Analysis Methodology*, Paper Presented at the Selection Specialists' Symposium of the International Personnel Management Association, Chicago, Illinois, July 6-9, 1976.

Brumback, G. B.; Edwards, D. S.; Fleishman, E. A.; and Romashko, T., *Model Procedures for Job Analysis, Test Development and Validation,* Vol. II, Final Report of the Second Phase, American Institutes for Research, Washington, D. C., February 1975.

Brumback, G. B.; Romashko, T.; Hahn, C. P.; and Fleishman, E. A., *Model Procedures for Job Analysis, Test Development, and Validation,* Vol. I, Final Report of the First Phase, American Institutes for Research, Washington, D. C., July 1974.

Brumback, G. B. and Vincent, J. W., "Jobs and Appraisal of Performance," *Personnel Administration,* Vol. 23, 1970, pp. 26-30.

Brumback, G. B. and Vincent, J. W., "Factor Analysis of Work-Performed Data for a Sample of Administrative, Professional, and Scientific Positions," *Personnel Psychology,* Vol. 23, 1970, pp. 101-107.

Brush, D. H. and Owens, W. A., "Implementation and Evaluation of an Assessment Classification Model for Manpower Utilization," *Personnel Psychology,* Vol. 32, No. 2, 1979, pp. 369-383.

Burack, E. H. and Walker, J. W. (eds.), *Manpower Planning and Programming,* Allyn and Bacon, Boston, Massachusetts, 1972.

Burgar, P. S., "Have Behavioral Expectation Scales Fulfilled our Expectations? Theoretical and Empirical Review," JSAS *Catalog of Selected Documents in Psychology,* Vol. 8, (Ms. No. 1745), 1978.

Cain, P. S. and Treiman, D. J., "The Dictionary of Occupational Titles as a Source of Occupational Data," *American Sociological Review,* Vol. 46, June 1981, pp. 253-278.

California Occupational Analysis Field Center, *Instructor's Training Guide: Handbook for Analyzing Jobs.*

Campbell, Gordon M., *A Standardized Task Format for Personnel Requirements Information System Methodology (PRISM),* Preliminary Report, U. S. Naval Personnel Research Activity, San Diego, California, March 1968.

Campbell, Gordon, M. and Megling, R. C., *Preliminary Data Elements for New Systems: Personnel Requirements Data System,* Research Memorandum SRM 69-6, U. S. Naval Personnel Research Activity, San Diego, California, 1968.

Campbell, J. P.; Dunnette, M. D.; Arvey, R. D.; and Hellervik, L. V., "The Development and Evaluation of Behaviorally Based Rating Scales," *Journal of Applied Psychology,* Vol. 57, No. 1, 1973, pp. 15-22.

Campion, J. E.; Greener, J.; and Wernli, S., "Work Observation Versus Recall in Developing Examples for Rating Scales," *Journal of Applied Psychology,* Vol. 58, 1973, pp. 286-288.

Canger, J. M. and Hensley, S. E., "Review of the Job Element Method," In *Human Resources in Criminal Justice: Volume II. Critiques of Job Analysis Methods,* University of South Florida, Human Resources Institute, Center for Evaluation Research, Tampa, Florida, June 1980, pp. 125-143.

Carpenter, J. B., *Sensitivity of Group Job Descriptions to Possible Inaccuracies in Individual Job Descriptions,* (AFHRL-TR-74-6), Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1974. JSAS *Catalog of Selected Documents in Psychology,* Vol. 4, (Ms. No 811), 1974.

Carpenter, J. B.; Giorgia, M. J.; and McFarland, B. P., *Comparative Analysis of the Relative Validity for Subjective Time Rating Scales,* Occupational and Manpower Research Division, Lackland Air Force Base, Texas, 1976. JSAS *Catalog of Selected Documents in Psychology,* Vol. 6, pp. 57-58.

Carroll, S. J., Jr. and Taylor, W. H., Jr., "Validity of Estimates by Clerical Personnel of Job Time Proportions," *Journal of Applied Psychology,* Vol. 53, 1969, pp. 164-166.

Cascio, W., *Applied Psychology in Personnel Management,* Reston Publishing Company, Reston, Virginia, 1978, pp. 131-154.

Chisolm, R. F. and Cummings, T. G., "Job Characteristics, Alienation, and Work-Related Behavior: A Study of Professional Employees, "*Journal of Management,* Vol. 5, 1979, pp. 57-70.

Christal, R. E., *The United States Air Force Occupational Research Project,* (AFHRL-TR-73-75), Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1974. JSAS *Catalog of Selected Documents in Psychology,* Vol. 4, (Ms. No 651), 1974.

Christal, R. E. and Weissmuller, J. J., *New Comprehensive Occupational Data Analysis Programs (CODAP) for Analyzing Task Factor Information,* (AFHRL Interim Professional Paper No. TR-76-3), Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1976. JSAS *Catalog of Selected Documents in Psychology,* Vol. 7, (Ms. No. 1444), 1977.

Churchill, G. A.; Ford, N. M.; and Walker, O. C., "Measuring the Job Satisfaction of Industrial Salesman," *Journal of Marketing Research,* Vol. 11, No. 3, 1974, pp. 254-260.

Colbert, G. A., and Taylor, L. R., "Empirically Derived Job Families as a Foundation for the Study of Validity Generalization," *Personnel Psychology,* Vol. 31, No. 2, 1978, pp. 355-364.

Connell, K. F.; Lobdell, N. E.; and Stock, J. R., *Summary Report and Work Plan: An Exploratory and Pilot Study of Task Analysis of Social Welfare Jobs,* Battelle Memorial Institute, Columbus, Ohio, 1970.

Cornelius, E. T. III; Carron, T. J.; and Collins, M. N., "Job Analysis Models and Job Classification," *Personnel Psychology,* Vol. 32, No. 4, 1979, pp. 693-708.

Cornelius, E. T. III; Hakel, M. D.; and Sackett, P. R., "A Methodological Approach to Job Classification for Performance Appraisal Purposes," *Personnel Psychology*, Vol. 32, No. 2, 1979, pp. 283-297.

Cornelius, E. T. III and Lyness, K. S., "A Comparison of Holistic and Decomposed Judgment Strategies in Job Analyses by Job Incumbents," *Journal of Applied Psychology*, Vol. 65, No. 2, 1980, pp. 155-163.

Cottle, William C., "A Factorial Study of the Multiphasic, Strong, Kuder, and Bell Inventories using a Population of Adult Males, *Psychometrika*, Vol. 15, No. 1, March 1950.

Covington, Janet B.; Trimmer, Harvey, W., Jr.; and Klein, Freda, *Use of the General Aptitude Test to Predict Success on the Tests of General Educational Development.*

Craig, R. (ed.), *Training and Development Handbook*, 2nd ed., McGraw-Hill, New York, New York, 1976.

Cronbach, L. J. and Gleser, G. C., "Assessing Similarity Between Profiles," *Psychological Bulletin*, Vol. 50, 1953, pp. 456-473.

Cunningham, J. W., *"Ergometrics": A Systematic Approach to Some Educational Problems*, (Center Monograph No. 7), North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1971. JSAS *Catalog of Selected Documents in Psychology*, Vol. 4, (Ms. No. 804), 1974.

Cunningham, Joseph W., and McCormick, E. J., *Factor Analyses of "Worker-Oriented" Job Variables*, Report No. 4, Prepared for Office of Naval Research, Department of the Navy, (Contract No. Nonr-1100 (19), Occupational Research Center, Purdue University, Lafayette, Indiana, July 1964.

Cunningham, J. W. and McCormick, E. J., *The Experimental Use of Worker-Oriented Job Variables in Determining Job Requirements*, Report No. 5, Prepared for Office of Naval Research, Department of the Navy, Contract No. Nonr-1100 (19), Occupational Research Center, Purdue University, Lafayette, Indiana, July 1964.

Cunningham, J. W.; Phillips, M. R.; and Spetz, S. H., *An Exploratory Study of a Job Component Approach to Estimating the Human Ability Requirements of Job Classifications in a State Competitive Service System*, North Carolina Office of State Personnel, Raleigh, North Carolina, 1976.

Cunningham, J. W.; Slonaker, D. F.; and Riegel, N. B., *The Development of Activity Preference Scales Based on Systematically Derived Work Dimensions: An Ergometric Approach to Interest Measurement* (Center Report, Ergometric Research and Development Series No. 15), North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1975. *JSAS Catalog of Selected Documents in Psychology*, Vol. 5, (Ms. No. 1154), 1975.

Cunningham, J. W.; Tuttle, T. C.; Floyd, J. R.; and Bates, J. A., *Occupation Analysis Inventory*, North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1970.

Cunningham, J. W.; Tuttle, T. C.; Floyd , J. R.; and Bates, J. A., *The Development of the Occupation Analysis Inventory: An "Ergometric" Approach to an Educational Problem*, (Center Research Monograph No. 6), North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1971. JSAS *Catalog of Selected Documents in Psychology*, Vol. 4, (Ms. No. 803), 1974.

Dagal, Ishwar, "Role Analysis Technique in Job Descriptions," *California Management Review*, Vol. XI, No. 4, Summer 1969.

Davis, Louis E., "Restructuring Jobs for Social Goals," *Manpower*, Vol. 2, No. 2, February 1970, pp. 2-6.

Davis, L. and Taylor, J. C., *Design of Jobs*, 2nd ed., Goodyear Publishing Co., Santa Monica, California, 1979.

Davis, Louis E. and Taylor, James C. (eds.), *Design of Jobs*, Penguin Books Inc., Baltimore, Md., 1972.

Dawis, Rene V. and Lofquist, Lloyd H., "Toward a Psychological Taxonomy of Work," *Journal of Vocational Behavior*, No. 7, 1975, pp. 165-171.

D'Costa, Hyres G., "The Development of a Vocational Interest Survey Using the 'Data-People-Things Model of Work'." Paper presented at the American Personnel and Guidance Association Convention, Las Vegas, Nevada, April 1, 1969.

DeGarmo, E. Paul, *Materials and Processes in Manufacturing*, The Macmillan Co., New York, 1957.

Delamontagne, R. "Design of a Supervisory Training Program," *Training and Development Journal*, Vol. 31, No. 9, 1977, pp. 40-42.

DeNisi, A. S., "The Implications of Job Clustering for Training Programs," *Journal of Occupational Psychology*, Vol. 49, 1976, pp. 105-113.

DeNisi, A. S., and McCormick, E. J., *The Cluster Analysis of Jobs Based on Data from the Position Analysis Questionnaire (PAQ)*, Purdue University, Occupational Research Center, West Lafayette, Indiana, 1974.

Desmond, R. E. and Weiss, D. J., "Supervisor Estimation of Abilities Required in Jobs," *Journal of Vocational Behavior*, Vol. 3, 1973, pp. 181-194.

Dickman, Robert A. "The Use of Functional Job Analysis as an Aid to Personnel," Paper presented at the American Personnel and Guidance Association Convention, Las Vegas, Nevada, April 1, 1969.

Distefano, M. K. and Pryer, M. W., "Work Behavior Dimensions of Psychiatric Attendants and Aides," *Journal of Applied Psychology*, Vol. 60, No. 1, 1975, pp. 140-142.

Dotson, C. O.; Santa Maria, D. L.; Davis, P. O.; and Schwartz, R. A., *Development of a Job-related Physical Performance Examination for Firefighters*, U. S. Department of Commerce, National Fire Prevention and Control Administration, Washington, D. C., 1977.

Dowell, B. E. and Wexley, K. N., "Development of a Work Behavior Taxonomy for First-line Supervisors," *Journal of Applied Psychology*, Vol. 63, 1978, pp. 563-572.

Dowell, D. R. (ed.), "Minimum Qualifications for Librarians," *North Carolina Libraries*, Vol. 38, 1980, pp. 7-29.

Drauden, G. M., *Entry-Level Professionals' Job Analysis and Selection Strategy: A Progress Report*, Minnesota Department of Personnel, Test Research and Development Section, St. Paul, Minnesota. JSAS *Catalog of Selected Documents in Psychology*, Vol. 7, (Ms. No. 1447), 1977.

Drauden, G. M. and Peterson, N. G., *A Domain Sampling Approach to Job Analysis*, State of Minnesota, Test Validation Center, St. Paul, Minnesota, 1974. JSAS *Catalog of Selected Documents in Psychology*, Vol. 7, (Ms. No. 1449), 1977.

Droege, Robert C. and Hawk, John, "Development of a U. S. Employment Service Interest Inventory," *Journal of Employment Counseling*, June 1977, pp. 65-69.

Dulewicz, S. V. and Keenay, G. A., "A Practically Oriented and Objective Method for Classifying and Assigning Senior Jobs," *Journal of Occupational Psychology*, Vol. 52, 1979, pp. 155-166.

Dumas, Neil S., "Job Analysis Method for Health-Related Professionals: A Pilot Study of Physicians and Therapists," *Journal of Applied Psychology*, Vol. 55, No. 5, 1971.

Dunham, R. B., "Reactions to Job Characteristics: Moderating Effects of the Organization," *Academy of Management Journal*, Vol. 20, No. 1, 1977, pp. 42-65.

Dunham, R. B., "The Measurement and Dimensionality of Job Characteristics," *Journal of Applied Psychology*, Vol. 61, No. 4, 1976, pp. 404-409.

Dunham, R. B., Aldag, R. J., and Brief, A. R., "Dimensionality of Task Design as Measured by the Job Diagnostic Survey," *Academy of Management Journal*, Vol. 20, No. 2, 1977, pp. 209-223.

Dunn, J., "A Safety Analysis Technique Derived from Skills Analysis," *Applied Ergonomics*, Vol. 3, No. 1, 1972, pp. 30-36.

Dunnette, M. D., "Aptitudes, Abilities, and Skills," In *Handbook of Industrial and Organizational Psychology*, M. D. Dunnette (ed.), Rand McNally, Chicago, Illinois, 1976, pp. 473-520.

Dunnette, M. D.; Hough, L. M.; and Rosse, R. L., "Task and Job Taxonomies as a Basis for Identifying Labor Supply Sources and Evaluating Employment Qualifications," *Human Resources Planning*, Vol. 2, No. 1, 1979, pp. 37-51.

Dunnette, M. D. and Motowildo, S. J., *Development of a Personnel Selection and Career Assessment System for Police Officer Patrol, Investigative, Supervisory, and Command Positions*, Personnel Decisions, Inc., Minneapolis, Minnesota, 1975.

Encyclopedia of Associations, Vol. I, 13th ed., Gale Research Co., Detroit, Michigan, 1979.

Epperson, L. L., "The Dynamics of Factor Comparison Point Evaluation," *Public Personnel Management*, Vol. 4, No. 1, 1975, pp. 38-48.

Evered, James, " How to Write a Good Job Description," *Supervisory Management*, April 1981, pp. 14-19

Executive Office of the President, Office of Management and Budget, *Standard Industrial Classification Manual*, Washington, D. C., 1967 and 1972.

Famularo, Joseph J., *Organization Planning Manual*, American Management Association, 1971.

Farina, A. J., Jr., *Development of a Taxonomy of Human Performance: A Review of Descriptive Schemes for Human Task Behavior*, American Institutes for Reserach, Washington, D. C., 1969. JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, (Ms. No. 318), 1973.

Farina, A. J., Jr. and Wheaton, G. R., *Development of a Taxonomy of Human Performance: The Task Characteristics Approach to Performance Prediction*, American Institutes for Research, Washington, D. C., 1969. JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, (Ms. No. 323), 1973.

Federal Mediation and Conciliation Service, *Job Evaluation: A Brief Guide*, Washington, D. C., 1965.

Feild, H. S. and Schoenfeldt, L. F., "Ward and Hook Revisited: A Two-Part Procedure for Overcoming a Deficiency in the Grouping of Persons," *Educational and Psychological Measurement*, Vol. 35, 1975, pp. 171-173.

Field, Timothy F. and Field, Janet E. (eds.), *The Classification of Jobs According to Worker Trait Factors* (An Addendum to the 1977 Edition of the Dictionary of Occupational Titles.)

Fine, Sidney A., *An Annotated Bibliography of Functional Job Analysis (FJA)*, Human Sciences Research, Inc., McLean, Virginia, June 1965.

Fine, Sidney A., "A Reexamination of Transferability of Skills," *Monthly Labor Review*, August 1957, pp. 1-19.

Fine, Sidney A., "A Structure of Worker Functions," *Personnel and Guidance Journal*, Vol. 34, No. 2, October 1955, pp. 66-73.

Fine, Sidney A., "Functional Job Analysis: An Approach to Technology for Manpower Planning," *Personnel Journal*, November 1974.

Fine, Sidney A., *Functional Job Analysis Scales: A Desk Aid*, Methods for Manpower Analysis No. 9, The W. E. Upjohn Institute for Employment Research, October 1974.

Fine, Sidney A., *Guidelines for the Design of New Careers*, The W. E. Upjohn Institute for Employment Research, September 1967.

Fine, Sidney A., "Matching Job Requirement and Worker Qualifications," *Personnel*, Vol. 34, No. 6, 1958, pp. 52-58.

Fine, Sidney A., "The Role of Functional Job Analysis in Current Manpower Problems," Paper presented at the American Personnel and Guidance Association Convention, Las Vegas, Nevada, April 1, 1969.

Fine, Sidney A., *The 1965 Third Edition of the Dictionary of Occupational Titles: Content, Contracts, and Critique*, The W. E. Upjohn Institute for Employment Research, December 1968.

Fine, Sidney A., "Use of the DOT to Estimate Educational Investment," *Journal of Human Resources*, Vol. III, No. 3, Summer 1968.

Fine, Sidney A., "U. S. E. S. Occupational Classification and Minnesota Occupational Rating Scales," *Journal of Counseling Psychology*, Vol. 4, No. 3, 1957.

Fine, Sidney A., and Heinz, Carl A., "The Estimates of Worker Trait Requirements for 4000 Jobs," *Personnel and Guidance Journal*, Vol. 36, No. 3, November 1957, pp. 168-174.

Fine, Sidney A., and Heinz, Carl A., "The Functional Occupational Classification Structure," *Personnel Guidance Journal*, Vol. 37, No. 3, November 1958, pp. 190-192.

Fine, Sidney A.; Holt, Ann M.; and Hutchinson, Maret F., *Functional Job Analysis: An Annotated Bibliography*, Methods for Manpower Analysis No. 10, The W. E. Upjohn Institute for Employment Research, May 1975.

Fine, Sidney A.; Holt, Ann M.; and Hutchinson, Maret F., *Functional Job Analysis: How to Standardize Task Statements*, The W. E. Upjohn Institute for Employment Research, October 1974.

Fine, Sidney A., and Wiley, Wretha W., *An Introduction to Functional Job Analysis: A Scaling of Selected Tasks from the Social Welfare Field*, The W. E. Upjohn Institute for Employment Research, September 1971.

Fine, Sidney, A. and Wiley, Wretha W., *An Introduction to Functional Job Analysis: Methods for Manpower Analysis*, The W. E. Upjohn Institute for Employment Research, (Monograph No. 4), Kalamazoo, Michigan, 1971.

Fingerman, P. W.; Eisner, E.; Rose, A. M.; Wheaton, G. R.; and Cohen, F., *Methods for Predicting Job-Ability Requirements: III Ability Requirements as a Function of Changes in the Characteristics of a Concept Identification Task*, American Institutes for Research, Washington, D. C., 1975.

Fivars, G., *The Critical Incident Technique: A Bibliography*, American Institutes for Research, Palo Alto, California, 1973.

Flanagen, John C., "Critical Requirements: A New Approach to Employee Evaluation," *Personnel Psychology*, Vol. 2, 1949, pp. 419-425.

Flanagen, John C., "The Critical Incident Technique," *Psychological Bulletin*, Vol. 51, No. 4, July 1954, pp. 327-358.

Fleishman, E. A., *Structure and Measurement of Physical Fitness*, Prentice Hall, Englewood Cliffs, New Jersey, 1964.

Fleishman, E. A., "On the Relation Between Abilities, Learning, and Human Performance," *American Psychologist*, Vol. 27, 1972, pp. 1017-1032.

Fleishman, E. A., "Toward a Taxonomy of Human Performance," *American Psychologist*, Vol. 30, No. 12, 1975, pp. 1127-1149.

Fleishman, E. A., *Physical Abilities Analysis Manual*, Advanced Research Resources Organization, Washington, D. C., 1977.

Fleishman, E. A., "Relating Individual Differences to the Dimensions of Human Tasks," *Ergonomics*, Vol. 21, No. 12, 1978, pp. 1007-1019.

Fleishman, E. A., "Evaluating Physical Abilities Required by Jobs," *The Personnel Administrator*, Vol. 24, No. 6, 1979, pp. 82-92.

Fleishman, E. A. and Hogan, J. C., *A Taxonomic Method for Assessing the Physical Requirements of Jobs: The Physical Abilities Analysis Approach*, Advanced Research Resources Organization, (Technical Report), Washington, D. C., 1978.

Fleishman, E. A.; Kinkade, R. G.; and Chambers, A. N., *Development of a Taxonomy of Human Performance: A Review of the First Year's Progress*, American Institutes for Research, Washington, D. C., 1968. JSAS *Catalog of Selected Documents in Psychology*, Vol. 2, (Ms. No. 111), 1972.

Fleishman, E. A. and Stephenson, R. W., *Development of a Taxonomy of Human Performance: A Review of the Third Year's Progress*, American Institutes for Research, Washington, D. C., 1970. JSAS *Catalog of Selected Documents in Psychology*, Vol. 2, (Ms. No. 113), 1972.

Fleishman, E. A.; Teichner, W. H.; and Stephenson, R. W., *Development of a Taxonomy of Human Performance: A Review of the Second Year's Progress*, American Institutes for Research, Washington, D. C., 1969. JSAS *Catalog of Selected Documents in Psychology*, Vol. 2, (Ms. No. 112), 1972.

Foley, J. P., *Task Analysis for Job Performance Aids and Related Training*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1973.

Foley, J. P., *Some Key Problems Concerning the Specification, Development and Use of Task Identification and Analyses*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, July 1976.

Freedman, R. D. and Dubno, P. "A New Approach to Managerial Position Descriptions," *Experimental Publication System*, Vol. 11, (Ms. No. 427-1), April 1971.

French, J. W. and Derman, D., *Seeking Markers for Temperament Factors*, (ETS PR-74-22), Educational Testing Service, Princeton, New Jersey, 1974.

Fruchter, Benjamin, et. al., *Efficiency of the Open-Ended Inventory in Eliciting Task Statements from Job Incumbents*, Personnel Research Laboratory, Aerospace Medical Division, Air Force Systems Command, Lackland Air Force Base, Texas, 1963.

Fugill, J. W., *Task Difficulty and Task Aptitude Benchmark Scales for the Administrative and General Career Field*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1973. JSAS *Catalog of Selected Documents in Psychology*, Vol. 4, (Ms. No. 591), 1974.

Furia, John J., *How to Make and Interpret Functional Organization Charts*, New York University, Graduate Division for Training in Public Service, Public Business Management Series #2, 1943.

Gael, S., *Development of Job Task Inventories and Their Use in Job Analysis Research*, American Telephone and Telegraph Company, New York, New York. JSAS *Catalog of Selected Documents in Psychology*, Vol. 7, (Ms. No. 1445), 1977.

Gael, S.; Grant, D. L.; and Ritchie, R. J., "Employment Test Validation for Minority and Nonminority Telephone Operators," *Journal of Applied Psychology*, Vol. 60, No. 4, 1975, pp. 411-419.

Gandy, J. A., *Validity Generalization and Cooperative Testing: Approaches and Prospects*, U. S. Civil Service Commission, Personnel Research and Development Center, Washington, D. C., July 1976.

Garza, A. T. and Carpenter, J. B., *Comparative Job Attributes of Airmen and Civil Service Personnel Having Similar Job Types*, (AFHRL 74-75), Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1974. JSAS *Catalog of Selected Documents in Psychology*, Vol. 5, (Ms. No. 897), 1975.

Georgia Peace Officers Standards and Training Council, *A Job Analysis of Entry Level Peace Officers in Georgia: Phase I Report, Project Careers*, Atlanta, Georgia, 1977.

Ghiselli, E. E., *The Validity of Occupational Aptitude Tests*, Wiley, New York, 1966.

Ghropade, J. and Atchison, T. J., "The Concept of Job Analysis: A Review and Some Suggestions," *Public Personnel Management*, Vol. 9, No. 3, 1980, pp. 134-144.

Gilpatrick, Eleanor, *Health Services Mobility Study*, City University of New York, Technical Report #12, U. S. Department of Labor Grant #82-34-69-34, March 1973.

Gilpatrick, E., *The Health Services Mobility Study Method of Task Analysis and Curriculum Design - Basic Tools: Concepts, Task Identification, Skill Scales and Knowledge System*, National Technical Information Service, (Research Report No. 11, Vol. 1), Springfield, Virginia, 1977.

Gilpatrick, E., *The Health Services Mobility Study Method of Task Analysis and Curriculum Design - Writing Task Descriptions and Scaling Tasks for Skills and Knowledge: A Manual*, National Technical Information Service, (Research Report No. 11, Vol. 2), Springfield, Virginia, 1977.

Gilpatrick, E., *The Health Services Mobility Study Method of Task Analysis and Curriculum Design - Using the Computer to Develop Job Ladders*, National Technical Information Service, (Research Report No. 11, Vol. 3), Springfield, Virginia, 1977.

Gilpatrick, E. and Gullion, C., *The Health Services Mobility Study Method of Task Analysis and Curriculum Design - Developing Curriculum Objectives From Task Data: A Manual*, National Technical Information Service, (Research Report No. 11, Vol. 4), Springfield, Virginia, 1977.

Goldstein, I. L., *Training: Program Development and Evaluation*, Wadsworth, Belmont, California, 1974.

Goodale, J. G. and Burke, R. J., "Behaviorally Based Rating Scales Need Not Be Job Specific," *Journal of Applied Psychology*, Vol. 60, 1975, pp. 389-391.

Gottfredson, Gary D. and Joffe, Richard D., *An Evaluation of Mobility - Based Occupational Classifications for Placement of Job Applicants*, The John Hopkins University, Center for Social Organization of Schools, Report No. 300, Baltimore, Maryland, December 1980.

Greene, C. N., "Casual Connections Among Managers' Merit Pay, Job Satisfaction, and Performance Relationship," *Journal of Applied Psychology*, Vol. 58, 1973, pp. 95-100.

Guion, R. M., "Content Validity: The Source of My Discontent," *Applied Psychological Measurement*, Vol. 1, 1977, pp. 1-10.

Guion, Robert M., *Personnel Testing*, McGraw-Hill Book Co., New York, 1965.

Hackman, J. R., "The Nature of the Task as a Determiner of Job Behavior," *Personnel Psychology*, Vol. 22, 1969, pp. 435-444.

Hackman, J. R., *On the Coming Demise of Job Enrichment*, Yale University, Department of Administrative Sciences, (Technical Report No. 9), New Haven, Connecticut, 1974.

Hackman, J. R. and Lawler, E. E., "Employee Reactions to Job Characteristics," *Journal of Applied Psychology*, Vol. 55, 1971, pp. 259-286.

Hackman, J. R. and Lee, M. D., *Redesigning Work: A Strategy for Change*, Work in America Institute, Scarsdale, New York, 1979.

Hackman, J. R. and Oldham, G. R., "Development of the Job Diagnostic Survey," *Journal of Applied Psychology*, Vol. 60, 1975, pp. 159-170.

Hackman, J. Richard and Oldham, Greg R., *The Job Diagnostic Survey: An Instrument for the Diagnosis of Jobs and the Evaluation of Job Redesign Projects*, Department of Administrative Sciences, Yale University, May 1974.

Hadley, H. I.; Marsh, C. N.; and Korotkin, A. L., *Standards for Establishing Grades of Army Assignments and for Conversion of Officer Positions/Duties to Enlisted Positions/Duties*, (U. S. Army Technical Report No. TR-77-A19), December 1977. JSAS *Catalog of Selected Documents in Psychology*, Vol. 9, (Ms. No. 1954), 1979.

Haemer, K. W., *Making the Most of Charts*, American Management Association, Management Bulletin No. 28, 1960.

Hahn, C. P.; Archer, R. F.; McNelis, J. R.; Romashko, T.; and Brumback, G. B., *Prototype Job Analyses of Three Supervisory Positions Within The New York City School System*, American Institutes for Research, Washington, D. C., June 1975.

Hall, F. S. and Albrecht, M. H., *The Management of Affirmative Action*, Goodyear Publishing Co., Santa Monica, California, 1979.

Hanser, L. M.; Mendel, R. M.; and Wolins, L., "Three Flies in the Ointment: A Reply to Arvey and Mossholder," *Personnel Psychology*, Vol. 32, No. 3, 1979, pp. 511-516.

Hartley, C.; Brecht, M.; Pageray, P.; Weeks, G.; Chapanis, A.; and Hoecker, D., "Subjective Time Estimates of Work Tasks by Office Workers," *Journal of Occupational Psychology*, Vol. 50, 1977, pp. 23-36.

Health Manpower Council of California, *Task Analysis Method for Improved Manpower Utilization in the Health Sciences*, Orinda, California, 1970.

Heath, W. D.; Cunningham, J. W.; and Augustin, J. W., *Ability Correlates of Systematically Derived Occupational Variables: A Repeated Study*, Ergometric Research and Development Series, Report No. 13, School of Education, North Carolina State University at Raleigh, 1975.

Heming, D. A., "What the Organization Chart Doesn't Show," *Supervisory Management*, May 1973.

Hemphill, J. K., "Job Descriptions for Executives," *Harvard Business Review*, Vol. 37, No. 5, 1959, pp. 55-67.

Hemphill, J. K., *Dimensions of Executive Positions*, Ohio State University, Bureau of Business Research, (Research Monograph No. 98), Columbus, Ohio, 1960.

Henderson, R. I., *Job Descriptions: Critical Documents, Versatile Tools*, AMACOM, New York, New York, 1975.

Henderson, Richard I., "Job Descriptions: Critical Documents, Versatile Tools," *Supervisory Management*, In four parts: Nov. and Dec. 1975; Jan. and Feb. 1976.

Herzberg, Frederick; Mausner, Bernard; Peterson, Richard O.; and Capwell, D. F., *Job Attitudes: Review of Research and Opinion*, Psychological Service of Pittsburgh, Pittsburgh, Pennsylvania, 1957.

Hofkosh, John M., and Hubbard, Donald (Registered Physical Therapists), *Physical Therapy Assistant Project*, Unpublished Report, Physical Therapy Department, Institute of Rehabilitation Medicine, New York City, May 1976.

Hogan, J. C. and Fleishman, E. A., "An Index of the Physical Effort Required in Human Task Performance," *Journal of Applied Psychology*, Vol. 64, No. 2, 1979, pp. 197-204.

Hogan, J. C.; Ogden, G. D.; and Fleishman, E. A. *Assessing Physical Requirements for Establishing Medical Standards in Selected Benchmark Jobs*, (Final Report), Advanced Research Resources Organization, Washington, D. C., 1978.

Holland, J. L.; Viernstein, M. C.; Kue, H.; Karweit, N. L.; and Blum, Z. D., "A Psychological Classification of Occupations," JSAS *Catalog of Selected Documents in Psychology*, Vol. 2, (Ms. No. 184), 1972.

Hough, L. M., *Job Activities Questionnaire for Retail Employees*, Personnel Decisions Research Institute, Minneapolis, Minnesota, 1977.

Hough, L. M., *Professional Activities Description Quetionnaire*, Personnel Decsions Research Institute, Minneapolis, Minnesota, 1979.

Industrial Relations Counselors, Library, *Job Analysis and Its Allied Activities: A Classified and Annotated Bibliography*, Industrial Relations Counselors, Inc., New York, New York, 1932.

Iowa Merit Employment Department Examination, Research, and Development Section, *Job Analysis Guidelines*, Des Moines, Iowa, July 1974.

Iowa Merit Employment Department Examination, Research, and Development Section, *Job Analysis Questionnaire*, (2nd ed.) Des Moines, Iowa, 1977.

Jackson, V. C., *Task Analysis, A Systematic Approach to Designing New Careers Programs*, New York University, New Careers Training Laboratory, New York, 1971.

Jaques, E., "Taking Time Seriously in Evaluating Jobs," *Havard Business Review*, Vol. 57, 1979, pp. 124-132.

Jeanneret, P. R. and McCormick, E. J., *The Job Dimensions of "Work Oriented" Job Variables and of Their Attribute Profiles as Based on Data from the Position Analysis Questionnaire*, Purdue University, Occupational Research Center, (Report No. 2), West Lafayette, Indiana, January 1969.

Jenkins, G. D.; Nadler, D. A.; Lawler, E. E. III; and Cammann, C., "Standard Observations: An Approach to Measuring the Nature of Jobs," *Journal of Applied Psychology*, Vol. 60, 1975, pp. 171-181.

Jones, J. J. and DeCotiis, T. A., "Job Analysis: National Survey Findings," *Personnel Journal*, Vol. 48, No. 10, 1969, pp. 805-809.

Katz, R., "Job Longevity as a Situational Factor in Job Satisfaction," *Administrative Science Quarterly*, Vol. 23, No. 2, 1978, pp. 204-223.

Kleinman, L. S. and Faley, R. H., "Assessing Content Validity: Standards Set by the Court," *Personnel Psychology*, Vol. 31, No. 4, 1978, pp. 701-713.

Krzystofiak, F.; Newman, J. M.; and Anderson, G., "A Quantified Approach to Measurement of Job Content: Procedures and Payoffs," *Personnel Psychology*, Vol. 32, No. 2, 1979, pp. 341-357.

Kuder, Frederick, "Career Matching," *Personnel Psychology*, Vol. 30, 1977, pp. 1-4.

Kvalseth, T. O. and Crossman, E. R., "The Jaquesian Level-of-Work Estimators: A Systematic Formulation," *Organizational Behavior and Human Performance*, Vol. 11, No. 3, 1974, pp. 303-315.

Lacy, D. P., Jr., "EEO Implications of Job Analysis," *Employee Relations Law Journal*, Vol. 4, No. 4, 1979, pp. 525-534.

Landy, F. J., "A Procedure for Occupational Clustering," *Organizational Behavior and Human Performance*, Vol. 8, 1972, pp. 109-117.

Landy, F. J.; Farr, J. L.; Saal, F. E.; and Freytag, W. R., "Behaviorally Anchored Scales for Rating the Performance of Police Officers," *Journal of Applied Psychology*, Vol. 61, No. 6, 1976, pp. 750-758.

Landy, F. J. and Trumbo, D. A., *Psychology of Work Behavior*, Dorsey Press, Homewood, Illinois, 1980.

Latham, G. P.; Fay, C. H.; and Saari, L. M., "The Development of Behavioral Observation Scales for Appraising the Performance of Foreman," *Personnel Psychology*, Vol. 32, No. 2, 1979, pp. 299-311.

Latham, G. P.; Saari, L. M.; Pursell, E. D.; and Campion, M. A., "The Situational Interview," *Journal of Applied Psychology*, Vol. 65, No. 4, 1980, pp. 422-427.

Latham, G. P. and Wexley, K. N., "Behavioral Observation Scales for Performance Appraisal Purposes," *Personnel Psychology*, Vol. 30, 1977, pp. 255-268.

Latham, G. P.; Wexley, K. N.; and Rand, T. M., "The Relevance of Behavioral Criteria Developed from the Critical Incident Technique," *Canadian Journal of Behavioral Science*, Vol. 7, 1975, pp. 349-358.

Lawshe, C. H., *Individual's Job Questionnaire Checklist of Office Operations,* Purdue University Bookstore, Lafayette, Indiana, 1955.

Lawshe, C. H., "A Quantitative Approach to Content Validity," *Personnel Psychology,* Vol. 28, No. 4, 1975, pp. 563-575.

Lecznar, W. B., *Three Methods for Estimating Difficulty of Job Task,* Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1971.

Lee, Budge V. "Preprinted Organization Chart Template," *Journal of Industrial Engineering,* Vol. XIX, No. 6, June 1968, p. xvi-xvii.

Leim, M. A. and Slivinski, L. W., "A Comparative Study of Middle and Senior Management Dimensions and Job Types in the Canadian Public Service," *Studies in Personnel Psychology,* Vol. 6, No. 2, 1975, pp. 21-34.

Levine, E. L.; Ash, R. A.; and Bennett, N., "Exploratory Comparative Study of Four Job Analysis Methods," *Journal of Applied Psychology,* Vol. 65, No. 5, October 1980, pp. 524-535.

Levine, E. L.; Ash, R. A.; Hall, H. L.; and Sistrunk, F., "Evaluation of Seven Job Analysis Methods by Experienced Job Analysts" In E. L. Levine (chair), *Job Analysis/Job Families: Current Perspective on Research and Application,* Symposium presented at Meeting of the American Psychological Association, Los Angeles, California, August 1981.

Levine, E. L.; Bennett, N.; and Ash, R. A., "Evaluation and Use of Four Job Analysis Methods for Personnel Selection," *Public Personnel Management,* Vol. 8, 1979, pp. 146-151.

Levine, E. L. and Weiner, H. R., "Review of Work-Oriented Job Analysis Methods: Functional Job Analysis, Task Analysis, and Related Techniques," In *Human Resources in Criminal Justice: Volume II. Critique of Job Analysis Methods,* University of South Florida, Human Resources Institute, Center for Evaluation Research, Tampa, Florida, June 1980, pp. 25-70.

Levine, E. L. and Weiner, H. R., "Review of the Ability Requirements Scales," In *Human Resources in Criminal Justice: Volume II. Critique of Job Analysis Methods,* University of South Florida, Human Resources Institute, Center for Evaluation Research, Tampa, Florida, June 1980, pp. 71-87.

Levine, E. L., and Weitz, J. "Relationship Between Task Difficulty and the Criterion: Should We Measure Early or Late?" *Journal of Applied Psychology,* Vol. 55, No. 6, 1971, pp. 512-520.

Levine, J. M.; Romashko, T.; and Fleishman, E. A., "Evaluation of an Abilities Classification System for Integrating and Generalizing Human Performance Research Findings: An Application to Vigilance Tasks," *Journal of Applied Psychology,* Vol. 58, 1973, pp. 149-157.

Lewin, D., "Cautions in Using Job Analysis Data for Test Planning," *Public Personnel Management*, Vol. 5, 1976, pp. 49-66

Lewis, Leon, *Job Redesign For the Mentally Retarded*, A Presentation to the Joseph P. Kennedy, Jr. Foundation, Fourth International Scientific Symposium On Mental Retardation, April 1968.

Lindberg, Roy A., *Processes and Materials of Manufacture*, 2nd ed., Allyn & Bacon, Inc. Boston, Mass., 1977.

Lissitz, R. W.; Mendoza, J. L.; Huberty, C. J.; and Markos, H. V., "Some Further Ideas on a Methodology for Determining Job Similarities/Differences," *Personnel Psychology*, Vol. 32, No., 1979, pp. 517-528.

Livernash, E. R. (ed.), *Comparable Worth: Issues and Alternatives*, Equal Employment Advisory Council, Washington, D. C., 1980.

Long, William F., *The Development Status of Job Analysis*, BBR Report, prepared under Contract UI-7158 between California State College, Los Angeles Foundation and State of California Human Resources Development Department, Bureau of Business Research, California State College, Long Beach, 1968.

Love, K. G., *Validation of Selection Procedures for Police Classes: Officer, Sergeant, Lieutenant, and Captain*, (Phase I: Job Analysis), City of Tampa, Civil Service Board, Test Validation Division, Tampa, Florida, June 1978.

Lowe, R. L.; Cook, K. R.; and Rannefield, D. N., "Project Careers: A Job Analysis of Entry-Level Peace Officers in Georgia," In *Proceedings of the National Symposium on Job-Task Analysis in Criminal Justice*, U.S. Department of Justice, Law Enforcement Assistance Administration, Washington, D. C., 1978.

Lytle, C. W., *Job Evaluation Methods*, 2nd Edition, Ronald Press, New York, 1954.

Magginnis, E. B.; Uchima, A.; and Smith, C. E., *Establishing Aptitude Requirements for Air Force Jobs: Methodological Approaches*, (U.S. AFHRL Technical Report), System Development Corp., Santa Monica, California, October 1975.

Maier, M. H. and Fuchs, E. F., *Development of Improved Aptitude Area Composites for Enlisted Classification*, (Technical Research Report 1159) U.S. Army Behavioral Science Research Laboratory, Arlington, Virginia, 1969.

Maier, M. H. and Fuchs, E. F., *Development and Evaluation of a New ACB and Aptitude Area System*, (Technical Research Note 239), U.S. Army Behavior and Systems Research Laboratory, Arlington, Virginia, 1972. JSAS *Catalog of Selected Documents in Psychology*, Vol. 5, (Ms. No. 971), 1975.

Malinowski, Frank A., "Job Selection Using Task Analysis," *Personnel Journal*, April 1981, pp. 288-291.

Mandell, Milton M., *The Selection Process*, American Management Association, 1964.

Marquardt, L. D. and McCormick, E. J., *Attribute Ratings and Profiles of the Job Elements of the Position Analysis Questionnaire (PAQ)*, (Report No. 1), Purdue University, Occupational Research Center, West Lafayette, Indiana, June 1974.

Marquardt, L. D. and McCormick, E. J., *Component Analyses of the Attribute Data Based on the Position Analysis Questionnaire (PAQ)*, Purdue University, Occupational Research Center, West Lafayette, Indiana, 1973.

Marquardt, L. D. and McCormick, E. J., *The Job Dimensions Underlying the Job Elements of the Position Analysis Questionnaire (PAQ) Form B.*, Purdue University, Occupational Research Center, West Lafayette, Indiana, June 1974.

Marquardt, L. D. and McCormick, E. J., *The Utility of Job Dimensions Based on Form B of the Position Analysis Questionnaire (PAQ) in a Job Component Validation Model*, Purdue University, Occupational Research Center, West Lafayette, Indiana, July 1974.

Maslow, A., "Job Analysis," In *Public Sector Employment Selection*, G. H. Wright (ed.), International Personnel Management Assocation, Chicago, Illinois, 1974.

Matthies, Leslie H., "Stop Knocking the Organization Chart," *The Office*, May 1966, pp. 12-24.

Mayo, C. C.; Nance, D. M.; and Shigekawa, L., *Evaluation of the Job Inventory Approach in Analyzing U.S. Air Force Utilization Fields*, (U.S. AFHRL Final Report No. TR-75-22, June 1975), Lifson, Wilson, Ferguson and Winick, Inc., Houston, Texas, 1975. JSAS *Catalog of Selected Documents in Psychology*, Vol. 5, (Ms. No. 1136), 1975.

McCall, M. W., Jr; Morrison, A. M.; and Hannan, R. L., *Studies of Managerial Work: Results and Methods*, (Technical Report No. 9), Center for Creative Leadership, Greensboro, North Carolina, May 1978.

McCall, M. W. and Segrist, C. A., *In Pursuit of the Manager's Job: Building on Mintzberg*, (Technical Report No. 14), Center for Creative Leadership, Greensboro, North Carolina, March 1980.

McCormick, E. J., "Job Analysis: An Overview," *Indiana Journal of Industrial Relations*, Vol. 6, No. 1, 1970, pp. 5-14.

McCormick, E. J., *The Application of Structured Job Analysis Information Based on the Position Analysis Questionnaire, PAQ*, Purdue University, Occupational Research Center, West Lafayette, Indiana, October 1974.

McCormick, E. J., "Job Information: Its Development and Applications," *Staffing Policies and Strategies*, D. Yoder and H. G. Heneman (eds.), The Bureau of National Affairs, Inc., Washington, D. C., 1974, pp. 35-83.

McCormick, E. J., "Job and Task Analysis," In *Handbook of Industrial and Organizational Psychology*, M. D. Dunnette (ed.), Rand McNally, Chicago, Illinois, 1976, pp. 651-696.

McCormick, Ernest J., *Job Analysis: Methods and Applications*, AMACON Division of American Management Associations, New York, 1979.

McCormick, E. J., "The Development of Processes for Indirect or Synthetic Validity: III. Applications of Job Analysis to Indirect Validity. A Symposium," *Personnel Psychology*, Vol. 12, 1959, pp. 402-413.

McCormick, Ernest J., *The Development, Analysis, and Experimental Application of Worker-Oriented Job Variables*, Report No. 8, Prepared for Office of Naval Research, Department of the Navy, Contract No. Nonr-1100 (19), Occupational Research Center, Purdue University, Lafayette, Indiana, July 1964.

McCormick, E. J.; Denisi, A. S.; and Shaw, J. B., *Job-Derived Selection: Follow Up Report*, Purdue University, Department of Psychological Sciences, West Lafayette, Indiana, May 1977.

McCormick, E. J.; Denisi, A. S.; and Shaw, J. B., "Use of the Position Analysis Questionnaire for Establishing the Job Component Validity of Tests," *Journal of Applied Psychology*, Vol. 64, No. 1, 1979, pp. 51-56.

McCormick, E. J.; Jeanneret, P. R.; and Mecham, R. C., *The Development and Background of the Position Analysis Questionnaire (PAQ)*, Purdue University, Occupational Research Center, West Lafayette, Indiana, 1969.

McCormick, E. J.; Jeanneret, P. R.; and Mecham, R. C., *Position Analysis Questionnaire (PAQ)*, Purdue University, Occupational Research Center, West Lafayette, Indiana, 1969.

McCormick, Ernest J; Jeanneret, Paul R.; and Mecham, Robert E., "A Study of Job Characteristics and Job Dimensions as based on the Position Analysis Questionnaire (PAQ)," *Journal of Applied Psychology*, Monograph Vol. 560, No. 4, August 1972.

McCormick, E. J. and Mecham, R. C., "Job Analysis Data as a Basis for Synthetic Test Validity," *Psychology Annual*, Vol. 4, 1970, pp. 30-35.

McCormick, E. J.; Mecham, R. C.; and Jeanneret, P. R., *Technical Manual for the Position Analysis Questionnaire (PAQ)*, PAQ Services, West Lafayette, Indiana, 1972.

McCormick, E. J.; Mecham, R. C.; and Jeanneret, P. R., *Position Analysis Questionnaire -Technical Manual (System II)*, PAQ Services, Inc., Logan Utah, 1977.

McDougle, Larry G., "The Job Description: Setting the Standard for Employee Development," *Supervisory Management*, February 1970.

McFarland, B. P., *Potential Uses of Occupational Analysis Data by Air Force Management Engineering Teams*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1974.

McFarland, B. P., *A Comparison of Task Difficulty Ratings Made by Nurses and Medical Service Corpsmen*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1974. JSAS *Catalog of Selected Documents in Psychology*, Vol. 4, (Ms. No. 717), 1974.

McFarland, B. P., *Job Analysis of The Medical Service Career Field*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1974. JSAS *Catalog of Selected Documents in Psychology*, Vol. 4, (Ms. No. 716), 1974.

McIntyre, R. M. and Farr, J. L., "Comment on Arvey and Mossholder's, 'A Proposed Methodology for Determining Similarities and Differences Among Jobs'," *Personnel Psychology*, Vol. 32, No. 3, 1979, pp. 507-510.

McKinney, T. S., *Police Officer: A Job Analysis*, City of Phoenix Personnel Department, Phoenix, Arizona, October 1974.

McNulty, Louise A., "Job Enrichment: How to Make it Work," *Supervisory Management*, September 1973, pp. 7-15.

Mead, D. F., *Continuation Study on Development of a Method for Evaluating Job Difficulty*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1970.

Mead, D. F., *Development of an Equation for Evaluating Job Difficulty*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1970.

Mecham, R. C. and McCormick, E. J., *The Use of Data Based on the Position Analysis Questionnaire (PAQ) in Developing Synthetically-Derived Attribute Requirements of Jobs*, Purdue University, Occupational Research Center, West Lafayette, Indiana, June 1969.

Mecham, R. C. and McCormick, E. J., *The Use In Job Evaluation of Job Elements and Job Dimensions Based on the Position Analysis Questionnaire*, Purdue University, Occupational Research Center, West Lafayette, Indiana, June 1969.

Mecham, R. C. and McCormick, E. J., *The Rated Attribute Requirements of Job Elements in the Position Analysis Questionnaire*, Purdue University, Occupational Research Center, West Lafayette, Indiana, 1969.

Melching, W. H. and Borcher, H. D., *Procedures for Constructing and Using Task Inventories*, The Ohio State University, Columbus, Ohio, 1973.

Meltzer, D. and Arguello, T., "The Job Element Approach to Job Analysis," Career Service Authority, Denver, Colorado, 1973.

Metzger, Norman, "Scientific Approach to Job Evaluation: Writing the Job Description," *Hospital Topics*, November 1967.

Miller, R. B., *Development of a Taxonomy of Human Performance: A User-Oriented Approach*, (AIR Technical Report No. 726/2035-2/71-TR-6), American Institutes for Research, Washington, D. C., 1971. JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, (Ms. No. 322), 1973.

Miller, R. B., *A Method for Determining Task Strategies,* American Institutes for Research, Silver Spring, Maryland, May 1974. JSAS *Catalog of Selected Documents in Psychology, Vol. 4, 1974.*

Miner, M. B. and Miner, J. B., Uniform Guidelines on Employee Selection Procedures, Bureau of National Affairs, Washington, D. C., 1979.

Mintzberg, H., "Structured Observation as a Method to Study Managerial Work," *The Journal of Management Studies,* Vol. 7, 1970, pp. 87-104.

Mintzberg, H., "Managerial Work: Analysis from Observation," *Management Science,* Vol. 18, 1971, pp. B-97 — B-110.

Mintzberg, H., *The Nature of Managerial Work,* Harper and Row, New York, 1973.

Mintzberg, H., "The Manager's Job: Folklore and Fact," *Harvard Business Review,* Vol. 53, No. 4, 1975, pp. 49-61

Mobley, W. H. and Ramsay, R. S., "Hierarchical Clustering on the Basis of Inter-Job Similarity as a Tool in Validity Generalization," *Personnel Psychology,* Vol. 26, 1973, pp. 213-225.

Moore, B. E., *Occupational Analysis for Human Resource Development: A Review of the Task Inventory,* (Research Report No. 25), U. S. Department of the Navy, Office of Civilian Manpower Management, Washington, D. C., April 1976.

Morgan, B. B., and Alluisi, E. A., "Synthetic Work: Methodology for Assessment of Human Peformance," *Perceptual and Motor Skills,* Vol. 35, No. 3, 1972, pp. 835-845.

Morrison, R. F., "A Multivariate Model for the Occupational Placement Decision," *Journal of Applied Psychology,* Vol. 62, No. 3, 1977, pp. 271-277.

Morsch, Joseph E., *Evaluation of a Job Inventory and Tryout of Task Rating Factors,* Personnel Research Laboratory, Aerospace Medical Division, Air Force Systems Command, Lackland Air Force Base, Texas, 1965.

Morsch, Joseph E., *Impact of the Computer on Job Analysis in the United States Air Force,* Personnel Research Laboratory, Aerospace Medical Division, Air Force Systems Command, Lackland Air Force Base, Texas, 1966.

Morsch, Joseph E.; Madden, J. M.; and Christal, R. E., *Job Analysis in the United States Air Force,* WADD-TR-61-113, February 1961.

Morse, J. J. and Wagner, F. R., "Measuring the Process of Managerial Effectiveness," *Academy of Management Journal,* Vol. 21, No. 1, 1978, pp. 23-25.

Mosel, J. N.; Fine, S. A.; and Boling, J., "The Scalability of Estimated Worker Requirements," *Journal of Applied Psychology,* 44, 1960, pp. 156-160.

Murphy, R. H., "A Personalized Skills Inventory: The North American Rockwell Story," In *Manpower Planning and Programming*, E. H. Burack and J. W. Walker (eds.), Allyn and Bacon, Boston, Massachussetts, 1972.

Mussio, S. J. and Smith, M. K., *Content Validity: A Procedural Manual*, International Personnel Management Association, Chicago, Illinois, 1973.

National Commission on Technology, Automation, and Economic Progress, *The Employment Impact of Technological Change*, Appendix Vol. II, "Technology and the American Economy," The Report of the Commission, February 1966.

National Trade and Professional Associations of the United States, Columbia Book Publishers, Washington, D. C.

Neeb, R. W.; Cunningham, J. W.; and Pass, J. J., *Human Attribute Requirements of Work Elements: Further Development of The Occupational Analysis Inventory*, (Center Research Monograph No. 7), North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1971. JSAS *Catalog of Selected Documents in Psychology*, Vol. 4, (Ms. No. 805), 1974.

Neff, Walter S., "Problems of Work Evaluation," *Personnel and Guidance Journal*, Vol. 44, 1966, pp. 682-688.

Newman, J. E., "Understanding the Organizational Structure - Job Attitude Relationships Through Perception of the Work Environment," *Organizational Behavior and Human Performance*, Vol. 14, 1975, pp. 371-397.

Newman, Jack and Fine, Sidney A., "Validity of Job Descriptions for Physical Requirements and Work Condition Information," *Personnel Psychology*, Vol. 10, No. 2, October 1957, pp. 181-189.

New York State Department of Labor, Division of Employment, *Guide to Occupational Analysis and Industry Services*, October 1958.

New York State Department of Labor, Occupational Analysis Field Center, *An Application of the Labor Department's Job Restructuring Methodology to Physical Therapy Activities*, 1977.

New York State Department of Labor, Occupational Analysis Field Center, *Task Bank of Physical Therapy Activities*, 1977.

New York State Department of Labor, Occupational Analysis Field Center, *The Importance of Job Analysis in the U. S. Department of Labor's Aptitude-Test Development Program: Pilot Studies at Six Plants of a Major Corporation*, unpublished report, July 1978.

New York State Office of Court Administration, *Proposed Classification Plan for Non-Judicial Positions in the Unified Court System*, Albany, New York, September 1978.

Northrup, H. R., "Wage Setting and Collective Bargaining," In *Comparable Worth: Issues and Alternatives*, E. R. Livernash (ed.), Equal Employment Advisory Council, Washington, D. C., 1980, pp. 107-136.

Nosow, Sigmund and Form, William H. (eds.), *Man, Work, and Society*, Basic Books, New York, 1962.

O'Brien, R. E.; Kraemer, R. E.; and Huggard, D. F., *Procedures for the Derivation of Mission-Relevant Unit Task Statement*, Human Resources Research Organization, Alexandria, Virginia, May 1975.

O'Conner, Robert E., "The Pulp and Paper Industry" in *Encyclopedia of Careers and Vocational Guidance: Vol. I Planning your Career*, William E. Hopke (ed.), Doubleday & Co., New York, 1967, pp. 561-568.

O'Toole, J., "Work in America and the Great Job Satisfaction Controversy," *Journal of Occupational Medicine*, Vol. 16, 1974, pp. 710-715.

O'Toole, James (ed.), *Work and the Quality of Life: Resource Papers for Work in America*, Prepared under Auspices of the W. E. Upjohn Institute, MIT Press, Cambridge, Mass., 1974.

Owens, W. A. and Schoenfeldt, L. F., "Toward a Classification of Persons," *Journal of Applied Psychology*, Vol. 65, No. 5, 1979, pp. 569-607.

Pajer, R. G. (ed.), *Job Analysis: Developing and Documenting Data*, U. S. Civil Service Commission, Washington, D. C., 1973.

Palmer, C. E., "Dog Catchers: A Descriptive Study," *Qualitative Sociology*, Vol. 1, No. 1, 1978, pp. 79-107.

Parasuraman, R., "Consistency of Individual Differences in Human Vigilance Performance: An Abilities Classification Approach," *Journal of Applied Psychology*, Vol. 61, 1976, pp. 486-492.

Pass, J. J. and Cunningham, J. W., *A Systematic Procedure for Estimating the Human Attribute Requirements of Occupations*, Ergometric Research and Development Series, Report No. 11, School of Education, North Carolina State University at Raleigh, 1975.

Pass, J. J. and Cunningham, J. W., *Occupational Clusters Based on Systematically Derived Work Dimensions: Final Report*, North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1977. JSAS *Catalog of Selected Documents in Psychology*, Vol. 8, (Ms. No. 1661), 1978.

Patten, T. H., Jr., *Manpower Planning and the Development of Human Resources*, Wiley and Sons, New York, New York, 1971.

Patten, T. H., Jr., *Pay*, Free Press, New York, New York, 1977.

Payne, S. S., *Reading Ease Level of D. C. Fire Department Written Materials Required for Entry-Level Job Performance*, U.S. Civil Service Commission, Personnel Research and Development Center, August 1976.

Payne, S. S. and Van Rijn, P., *Development of a Written Test of Cognitive Abilities for Entry into the D. C. Fire Department: The Task-Ability-Test Linkage Procedure,* U. S. Civil Service Commission, Personnel Research and Development Center, Washington, D.C., August 1978.

Pearlman, K., "Job Families: A Review and Discussion of Their Implications for Personnel Selection," *Psychological Bulletin,* Vol. 87, No. 1, 1980, pp. 1-28.

Pearlman, K., *Job Families: A Review and Discussion of Their Potential Utility for Personnel Selection,* U. S. Civil Service Commission, Personnel Research and Development Center, Washington, D. C., March 1978.

Peterson, N. G.; Holtzman, J. S.; Bosshardt, M. J.; and Dunnette, M. D., *A Study of the Correctional Officer Job at Marion Correctional Institution, Ohio: Development of Selection Procedures, Training Recommendations, and an Exit Information Program,* Personnel Decisions Research Institute, Minneapolis, Minnesota, August 1977.

Pfeiffer, M. G.; Kuennapau, T.; and Fastiggi, C. F., "Common Elements Approach to Multidimensional Similarity Analysis Among Job Tasks," *Perceptual and Motor Skills,* Vol. 36, 1973, pp. 3-12.

Phillips, J. E., "Worker Function and Job Complexity," Position Paper, California Occupational Analysis Field Center, January 1979.

Pierce, J. L. and Dunham, R. B., "Task Design: A Literature Review" *Academy of Management Review,* Vol. 1, 1976, pp. 83-97.

Pierce, J. L. and Dunham, R. B., "The Measurement of Perceived Job Characteristics: The Job Diagnostic Survey Versus the Job Characteristics Inventory," *Academy of Management Journal,* Vol. 21, No. 1, 1978, pp. 123-128.

Prediger, Dale J., "Getting Ideas Out of the D.O.T. and into Vocational Guidance," *Vocational Guidance Quarterly,* June 1981, pp. 293-305.

Prien, E. P., "Development of a Supervisor Position Description Questionnaire," *Journal of Applied Psychology,* Vol. 47, 1963, pp. 10-14.

Prien, E. P., "Development of a Clerical Position Description Questionnaire," *Personnel Psychology,* Vol. 18, 1965, pp. 91-98.

Prien, Erich P., "The Function of Job Analysis in Content Validation," Personnel Psychology, Summer 1977, pp. 167-174.

Prien, Erich P. and Ronan, William W., "Job Analysis: A Review of Research Findings," Personnel Psychology, 1971, Vol. 24, pp. 371-396.

Primoff, E. S., *Summary of Job-Element Principles: Preparing a Job-Element Standard,* U.S. Civil Service Commission, Personnel Measurement and Development Center, Washington, D. C., 1971.

Primoff, E. S., *Using a Job-Element Study for Developing Tests,* U.S. Civil Service Commission, Personnel Measurement and Development Center, Washington, D. C., 1972.

Primoff, E. S., *The J-Coefficient Procedure,* U.S. Civil Service Commission, Personnel Measurement and Development Center, Washington, D. C., 1972.

Primoff, E. S., *The Job-Element Procedure in Relation to Employment Procedures for the Disadvantaged,* U.S. Civil Service Commission, Personnel Research and Development Center, Washington, D. C., 1972.

Primoff, Ernest S., *How to Prepare and Conduct Job Element Examinations,* Research Section, Personnel Research and Development Center, U.S. Civil Service Commission, Washington, D. C., 1975.

Ramirez, D. A. and Lotero, R., *Job Analysis for Personnel Selection: A Manual,* California State Personnel Board, 1973.

Reilly, R. R.; Zedeck, S.; and Teopyr, M. L., "Validity and Fairness of Physical Ability Tests for Predicting Performance in Craft Jobs," *Journal of Applied Psychology,* Vol. 64, No. 3, 1979, pp. 262-274.

Riccobono, J. A. and Cunningham, J. W., *Work Dimensions Derived Through Systematic Job Analysis: A Study of the Occupation Analysis Inventory,* (Center Research Monograph No. 8), North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1971. JSAS *Catalog of Selected Documents in Psychology,* Vol. 4, (Ms. No. 806), 1974.

Riccobono, J. A. and Cunningham, J. W., *Work Dimensions Derived Through Systematic Job Analysis: A Replicated Study of the Occupation Analysis Inventory,* (Center Research Monograph No. 9), North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1971. JSAS *Catalog of Selected Documents in Psychology,* Vol. 4, (Ms. No. 807), 1974.

Riccobono, J. A.; Cunningham, J. W.; and Boese, R. R., *Clusters of Occupations Based on Systematically Derived Work Dimensions: An Exploratory Study,* (Center Report, Ergometric Research and Development Series No. 10), North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1974. JSAS *Catalog of Selected Documents in Psychology,* Vol. 5, (Ms. No. 1150), 1975.

Richardson, Bellows, Henry and Co., Inc., *Job Requirements Questionnaire for Supervisory Classifications JRQ,* Washington, D.C., 1975.

Risher, H. W., "Job Analysis: A Management Perspective," *Employee Relations Law Journal,* Vol. 4, No. 4, 1979, pp. 535-551.

Robinson, Charles W., *The Dictionary of Occupational Titles in Vocational Assessment: A Self Study Manual,* Materials Development Center, Stout Vocational Rehabilitation Institute, University of Wisconsin - Stout, Menomonie, Wisconsin, September, 1979.

Robinson, D. D.; Wahlstron, O. W.; and Mecham, R. C., "Comparison of Job Evaluation Methods: A 'Policy Capturing' Approach Using the Position Analysis Questionnaire (PAQ)," *Journal of Applied Psychology*, Vol. 59, 1974, pp. 633-637.

Robinson, John P.; Athanasiou, Robert; and Head, Kendra B., *Measurements of Occupational Attitudes and Occupational Characteristics*, Survey Research Center, Institute for Social Research, University of Michigan, Ann Arbor, Michigan, 1969.

Rock, M. L. (ed.), *Handbook of Wage and Salary Administration*, McGraw-Hill, New York, New York, 1972.

Roe, Anne, *The Psychology of Occupations*, John Wiley & Sons, New York, 1966.

Romashko, T.; Brumback, G. B.,; and Fleishman, E. A., *The Development of a Procdure to Validate Physical Tests: Physical Requirements for the Fireman's Job*, American Institutes for Research, Washington, D. C., 1973.

Romashko, T.; Brumback, G. B.; Fleishman, E. A.; and Hahn, C. P., *The Development of a Procedure to Validate Physical Tests*, (Final Report), American Institutes for Research, Washington, D. C., 1974.

Romashko, T.; Hahn, C. P.; and Brumback, G. B., *The Prototype Development of Job-Related Physical Testing for Philadelphia Police Selection: Final Report*, American Institutes for Research, Washington, D.C., July, 1976.

Ronan, W. W.; Anderson, C. L.; and Talbert, T. L., "A Psychometric Approach to Job Performance: Fire Fighters," *Public Personnel Management*, Vol. 5, No. 6, 1976, pp. 409-413.

Ronan, W. W. and Latham, G. P., "The Reliability and Validity of the Critical Incident Technique: A Closer Look," *Studies in Personnel Psychology*, Vol. 6, 1974, pp. 53-64.

Ronan, W. W. and Prien, E. P., *Perspectives on the Measurement of Human Performance*, Appleton-Century-Crofts, New York, New York, 1971.

Ronan, W. W. and Prien, E. P., "Performance Evaluation, Task Analysis and Organization Research Bibliographies," JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, 1973.

Ronan, W. W.; Talbert, T. L.; and Mullet, G. W., "Prediction of Job Performance Dimensions: Police Officers," *Public Personnel Management*, Vol. 6, No. 3, 1977, pp. 173-180.

Rose, A. M.; Fingerman, P. W.; Wheaton, G. R.; Eisner, E.; and Kramer, G., *Methods for Predicting Job-Ability Requirements: II. Ability Requirements as a Function of Changes in the Characteristics of an Electronic Fault-Finding Task*, American Institutes for Research, Washington, D. C., 1974.

Rosenfeld, Michael and Thornton, Richard F., *A Case Study in Job Analysis Methodology*, Educational Testing Service, Princeton, New Jersey, 1976.

Rosenfeld, M. and Thornton, R. F., *The Development and Validation of a Multi-jurisdictional Police Examination,* Educational Testing Service, Center for Occupational and Professional Assessment, Princeton, New Jersey, June 1976.

Rouleau, Eugene J. and Krain, Burton F., "Using Job Analysis to Design Selection Procedures," *Public Personnel Management,* September-October 1975, pp. 300-304.

Rundquist, E. A., *Job Tasks and Technical Training Criteria Development,* Navy Training Research Institute, Naval Personnel and Training Research Laboratory, San Diego, California. JSAS *Catalog of Selected Documents in Psychology,* Vol. 1, (Ms. No. 46), 1971.

Rusmore, J. T., " Position Description Factors and Executive Promotion," *Personnel Psychology,* Vol. 26, 1973, pp. 135-138.

Salvendy, G. and Seymour, W. D., *Prediction and Development of Industrial Work Performance,* John Wiley, New York, New York, 1973.

Schneider, Benjamin, *Staffing Organizations,* The Goodyear Series in Management and Organizations, Goodyear Publishing Co., Inc., Pacific Palisades, California, 1976.

Schein, E. H., *Career Dynamics: Matching Individual and Organizational Needs,* Addison-Wesley, Reading, Massachussetts, 1978.

Schoderbik, Peter P. and Reif, William F., *Job Enlargement: Key to Improved Performance,* University of Michigan, Bureau of Industrial Relations, Ann Arbor, Michigan, 1969.

Schoenfeldt, L. F., "Utilization of Manpower: Development and Evaluation of an Assessment-Classification Model for Matching Individuals with Jobs," *Journal of Applied Psychology,* Vol. 59, 1974, pp. 583-595.

Schwab, D. P., "Job Evaluation and Pay Setting: Concepts and Practices," In *Comparable Worth: Issues and Alternatives,* E. R. Livernash (ed.), Equal Employment Advisory Council, Washington, D. C., 1980, pp. 49-77.

Schwab, D. P.; Heneman, H.; and DeCotiis, T., "Behaviorally Anchored Rating Scales: A Review of the Literature," *Personnel Psychology,* Vol. 28, 1975, pp. 549-562.

Schwitter, Joseph P. and Davis, David W. "Analyzing Jobs for Job Evaluation with Work Sampling," *Personnel Journal,* May 1965, pp. 246-252.

Scoville, James G., *Manpower and Occupational Analysis: Concepts and Meaurements,* Lexington Books, D. C. Heath & Co., Lexington, Massachusetts, 1972.

Seeborg, I. S., "The Influence of Employee Participation in Job Redesign," *Journal of Applied Behavioral Science,* Vol. 14, No. 1, 1978, pp. 87-98.

Selection Consulting Center, *The Validation of Entry-Level Firefighter Examination in the States of California and Nevada,* Sacramento, California, January, 1974.

Seymour, G. E.; Gunderson, E. K. E.; and Vallacher, R. R., "Clustering 34 Occupational Groups by Personality Dimensions," *Educational and Psychological Measurement*, Vol. 33, 1973, pp. 267-284.

Shartle, Carroll L., *Occupational Information: Its Development and Application*, 3rd Edition, Prentice Hall, Englewood Cliffs, N. J., 1959.

Shaw, J. B.; DeNisi, A. S.; and McCormick, E. J., *Cluster Analysis of Jobs Based on a Revised Set of Job Dimensions from the Position Analysis Questionnaire (PAQ)*, Purdue University, Department of Psychological Services, West Lafayette, Indiana, April 1977.

Shaw, J. B. and McCormick, E. J., *The Prediction of Job Ability Requirements Using Attribute Data Based on the Position Analysis Questionnaire (PAQ)*, Purdue University, Department of Psychological Sciences, West Lafayette, Indiana, October 1976.

Shaw, M. E., "Scaling Group Tasks: A Method for Dimensional Analysis," JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, (Ms. No. 294), 1973.

Shepherd, A., "An Improved Tabular Format for Task Analysis," *Journal of Occupational Psychology*, Vol. 49, No. 2, 1976, pp. 93-104.

Sims, H. P.; Szilagyi, A. D.; and Keller, R. T., "The Measurement of Job Characteristics," *Academy of Management Journal*, Vol. 19, 1976, pp. 195-212.

Sisk, Henry L., *Management and Organization*, 2nd ed., South-Western Publishing Co., Cincinnati, Ohio, 1973.

Sjogren, Douglas, "A Functional Approach to Curriculum Development," Paper presented at the American Personnel and Guidance Association Convention, Las Vegas, Nevada, April 1, 1969.

Smith, Arthur De W., *Generic Skills Research and Development*, Training Research and Development Station, Employment and Immigration, Canada, 1975.

Smith, J. E. and Hakel, M. D., "Convergence Among Data Sources, Response Bias, and Reliability and Validity of a Structured Job Analysis Questionnaire," *Personnel Psychology*, Vol. 32, No. 4, 1979, pp. 677-692.

Smith, P. C. and Kendall, L. M., "Retranslations of Expectations: An Approach to the Construction of Unambiguous Anchors for Rating Scales," *Journal of Applied Psychology*, Vol. 47, 1963, pp. 149-155.

Social Development Corporation, *Use of Manpower in a City Police Force*, January 1973.

Social Educational Research and Development, Inc., *A Task Analysis of Library Jobs In The State of Illinois*, Silver Spring, Maryland, May 1970.

Sparks, C. P., "Job Analysis Under the New Uniform Guidelines," In *Personnel Management: Compensation Service*, Prentice-Hall, Englewood Cliffs, New Jersey, 1979, pp. 379-384.

Sprecher, T. B., *Dimensions of Engineers Job Performance*, Education Testing Service, Princeton, New Jersey, 1976.

Sproule, C. F., "A Strategy for Resource Allocation in Public Personnel Selection," *Public Personnel Management Journal*, Vol. 9, No. 3, 1980, pp. 116-124.

Spirn, Steven and Solomon, Lanny, "A Key Element in EDP Personnel Management: Functional Job Analysis," *Personnel Journal*, November 1976, pp. 552-556.

State Industrial Directories, 1979 editions, State Industrial Directories Corporation, 2 Penn Plaza, New York, N. Y.

State of Wisconsin, *Selection-Oriented Job Analysis Procedures*, State Bureau of Personnel, Madison, Wisconsin, 1972.

Stead, William H. and Masincup, W. E., *The Occupational Research Program of the USES*, Public Administration Service, Chicago, 1943.

Stead, William H.; Shartle, Carroll L.; and Associates (of the Technical Board for the Occupational Research Program of the U.S.E.S.), *Occupational Counseling Techniques*, American Book Co., New York, 1940.

Stone, C. H., *Evaluation of the Marine Corps Task Analysis Program*, (Technical Report No. 16), California State University, Los Angeles Foundation, Los Angeles, California, June 1976.

Stone, C. Harold; Yoder, Dale; and Staff of California State College, *Job Analysis 1970*, Department of Human Resources Development, State of California, June 1970.

Strohmenger, C. Todd and Landrum, John H., "A Basic in Educational and Agency Career Counseling: The New DOT," *Vocational Guidance Quarterly*, June 1979, pp. 291-298.

Sturm, R., "Mass Validation: The Key to Effectively Analyzing an Employer's Job Classification," *Public Personnel Managemnt*, Vol. 8, No. 5, 1979, pp. 277-281.

Suojanen, Waino, et. al. (eds.), *Perspectives on Job Enrichment and Productivity*, Publishing Services Division, School of Business Administration, Georgia State University, Atlanta, 1975.

Super, Donald E., *The Psychology of Careers*, Harper & Row, New York, 1957.

Super, Donald E. and Crites, John O., *Appraising Vocational Fitness*, Harper & Row, New York, 1962.

Taber, T. D.; Beehr, T. A.; and Walsh, J. T., "The Relationship Between Objective and Perceived Job Characteristics," *Proceedings of the Academy of Management, 38th Annual Meeting*, 1978, pp. 89-93.

Taylor, L. R., "The Construction of Job Families Based on the Component and Overall Dimensions of the PAQ," *Personnel Psychology*, Vol. 31, No. 2, 1978, pp. 325-340.

Taylor, L. R. and Colbert, G. A., "The Construction of Job Families Based on the Company-Specific PAQ Job Dimensions," *Personnel Psychology*, Vol. 31, No. 2, 1978, pp. 341-354.

Teare, R. J., *Final Report: OCJET Job-Task Analysis Symposium*, (In Proceedings of the National Symposium on Job-Task Analysis in Criminal Justice), U. S. Department of Justice, Law Enforcement Assistance Administration, Washington, D. C., 1978.

Technomics, Inc., *Job Analysis Techniques for Restructuring Health Manpower Education and Training in the Navy Medical Department*, McLean, Virginia, 1974.

Teichner, W. H. and Whitehead, J., *Development of a Taxonomy of Human Performance: Evaluation of a Task-Classifiction System for Generalizing Research Findings*, (AIR Technical Report No. 726/2035-4/71-TR-8), American Institutes for Research, Washington, D. C., 1971. JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, (Ms. No. 324), 1973.

Tenopyr, M. L, "Content-Construct Confusion," *Personnel Psychology*, Vol. 30, No. 1, 1977, pp. 47-54.

Theologus, G. C., *Development of a Taxonomy of Human Performance: A Review of Biologic Taxonomy and Classification*, American Institutes for Research, Washington, D. C., 1969. JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, 1973.

Theologus, G. C. and Fleishman, E. A., *Development of a Taxonomy of Human Performance: Validation Study of Ability Scales for Classifying Human Tasks*, American Institutes for Research, Washington, D. C., April 1971. JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, (Ms. No. 326), 1973.

Theologus, G. C.; Romashko, T.; and Fleishman, E. A., *Development of a Taxonomy of Human Performance: A Feasibility Study of Ability Dimensions for Classifying Human Tasks*, American Institutes for Research, Washington, D. C., January 1970. JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, (Ms. No. 321), 1973.

Thomas Register of American Manufacturers, Thomas Publishing Company, One Penn Plaza, New York, N. Y., (14 vols.) 1979.

Thompson, J. L., "How Nuclear Reactor Operators Describe Their Job — A Basis for Operator Selection," *Personnel Selection and Training Bulletin*, Vol. 1, No. 2, 1980, pp. 56-65.

Thornton, G. C. and McCormick, E. J., *The Experimental Use of Dimensions of Worker-Oriented Job Variables in Determining Job Requirements*, Report No. 6, Prepared for Office of Naval Resarch, Department of the Navy, Contract No. Nonr - 1100 (19), Occupational Research Center, Purdue University, Lafayette, Indiana, July 1964.

Tiffin, Joseph and McCormick, Ernest J., *Industrial Psychology*, 5th ed., Prentice-Hall, Inc., Englewood Cliffs, N. J., 1965.

Tordy, G. R.; Eyde, L. D.; Primoff, E. S.; and Hardt, R. H., *Job Analysis of the Position of New York State Trooper: An Application of the Job Element Method*, New York State Police, State Campus, Albany, New York, June 1976.

Tornow, W. W. and Pinto, P. R., "The Development of a Managerial Job Taxonomy: A System for Describing, Classifying, and Evaluating Executive Positons," *Journal of Applied Psychology*, Vol. 61, No. 4, 1976, pp. 410-418.

Trattner, M. H., "Task Analysis in The Design of Three Concurrent Validity Studies of the Professional and Admnistrative Career Examination," *Personnel Psychology*, Vol. 32, No. 1, 1979, pp. 109-119.

Treiman, D. J., *Occupational Prestige in Comparative Perspective*, Academic Press, New York, New York, 1977.

Treiman, D. J., *Job Evaluaton: An Analytic Review: (Interim Report to the Equal Employment Opportunity Commission)*, National Academy of Sciences, Washington, D. C., February 1979.

Tryon, R. C. and Bailey, D. E., *Cluster Anaysis*, McGraw-Hill, New York, New York, 1970.

Turney, J. R. and Cohen, S. L., *Perceived Work Effort as Time Devoted to an Activity*, (U.S. Army Technical Paper No. 337, September 1978). JSAS *Catalog of Selected Documents in Psychology*, Vol. 10, (Ms. No. 1982), 1980.

Tuttle, T. C. and Cunningham, J. W., *Affective Correlates of Systematically-Derived Work Dimensions: Validation of the Occupation Analysis Inventory*, (Center Research Monograph No. 10), North Carolina State University, Center for Occupational Education, Raleigh, North Carolina, 1972. JSAS *Catalog of Selected Documents in Psychology*, Vol. 4, (Ms. No. 808), 1974.

Uniform Guidelines on Employee Selection Procedures, Federal Register, Vol. 43, No., 166, August 25, 1978.

U. S. Civil Service Commission, *Job Analysis: Development & Documenting Data; A Guide for State and Local Governments*, Washington, D. C., 1973.

U. S. Civil Service Commission, *Development of Qualification Standards*, Federal Personnel Manual System, (FPM Supplement 271-1), Washington, D. C., 1972.

U. S. Civil Service Commission, *Achieving Job-Related Selection for Entry-Level Police Officers and Firefighters*, Washington, D. C., 1973.

U. S. Civil Service Commission, *Handbook of Occupational Groups and Series of Classes*, Washington, D. C., 1973.

U. S. Civil Service Commission, *Job Analysis for Improved Job-Related Employee Development: A Guide for State and Local Governments*, Washington, D. C., 1976.

U. S. Civil Service Commission, *Job Analysis for Improved Job-Related Selection: A Guide for State and Local Governments*, Washington, D. C., 1975.

U. S. Civil Service Commission, *Job Analysis: Key to Better Management*, Washington, D. C., 1973.

U. S. Civil Service Commission, *Upward Mobility through Job Restructuring*, Personnel Management Series, No. 26, Washington, D. C., 1974.

U. S. Department of Commerce, *Standard Occupational Classification Manual*, 1977.

U. S. Department of Justice, Law Enforcement Assistance Administration, *Proceedings of the National Symposium on Job-Task Analysis in Criminal Justice*, Washington, D. C., 1978.

U. S. Department of Labor, *Handbook for Analyzing Jobs*, Washington, D. C., 1972.

U. S. Department of Labor, *A Handbook for Job Restructuring*, Washington, D. C., 1970.

U. S. Department of Labor, *Counselor's Handbook*, Washington, D. C., 1967.

U. S. Department of Labor, *Dictionary of Occupational Titles*, Fourth Ed., Washington, D. C., 1977.

U. S. Department of Labor, *Dictionary of Occupational Titles, Volume II: Occupational Classification and Industry Index*, Third Ed., Washington, D. C., 1965.

U. S. Department of Labor, *Directory of National Unions and Employee Associations*, Washington, D. C., 1975 and 1978 (Supplement).

U. S. Department of Labor, *Estimates of Worker Trait Requirements for 4,000 Jobs as Defined in the Dictionary of Occupational Titles*, Washington, D. C., 1957.

U. S. Department of Labor, *Estimating Worker Traits*, Washington, D. C., 1957.

U. S. Department of Labor, *Functional Occupational Classification Program Worker Trait Manuals - Training Time*, Washington, D. C., 1959.

U. S. Department of Labor, *General Aptitude Test Battery, Section III: Development*, Washington, D. C., 1970.

U. S. Department of Labor, *Guide for Occupational Exploration*, Washington, D. C., 1979.

U. S. Department of Labor, *Job Analysis for Human Resources Management: A Review of Selected Research and Development, (Manpower Research Monograph No. 36), Washington, D. C., 1974.*

U. S. Department of Labor, *Manual of Operating Instructions for Verification of Occupational Information*, Washington, D. C., 1960.

U. S. Department of Labor, *Relating General Educational Development to Career Planning*, Washington, D. C., 1971.

U. S. Department of Labor, *Selected Characteristics of Occupations Defined in the DOT*, Washington, D. C., 1980.

U. S. Department of Labor, *Task Analysis Inventories: A Method for Collecting Job Information*, Washington, D. C., 1973.

U. S. Department of Labor, *Work Performed Manual*, Washington, D. C., 1959.

U. S. Department of Labor, *Worker Traits Training Unit*, Manpower Administration Handbook No. 314, Washington, D. C., 1975.

U. S. Department of Labor, Employment Standards Administration, Office of Federal Contract Compliance Programs, *Federal Contract Compliance Manual*, Washington, D. C., 1979.

U. S. Equal Employment Opportunity Commission, "Guidelines on Employee Selection Procedures," *Federal Register*, Vol. 35, 1970, pp. 12333-12336.

U. S. Equal Employment Opportunity Commission, "Guidelines on Employee Selection Procedures," *Federal Register*, Vol. 41, 1976, pp. 51984-51986.

U. S. Equal Employment Opportunity Commission, Civil Service Commission, Department of Labor, and Department of Justice, "Adoption by Four Agencies of Uniform Guidelines on Employee Selection Procedures (1978)," *Federal Register*, Vol. 43, 1978, pp. 38290-38315.

U. S. Equal Employment Opportunity Commission, Office of Personnel Management, Department of Justice, Department of Labor, and Department of the Treasury, "Adoption of Questions and Answers to Clarify and Provide a Common Interpretation of the Uniform Guidelines on Employee Selection Procedures," *Federal Register*, Vol. 44, No. 43, 1979, pp. 11996-12009.

U. S. Equal Employment Opportunity Commission, Office of Personnel Management, Department of Justice, Department of the Treasury, Department of Labor, "Adoption of Additional Questions and Answers to Clarify and Provide a Common Interpretation of the Uniform Guidelines on Employee Selection Procedures," *Federal Register*, Vol. 45, No. 87, 1980, pp. 29530-29531.

Uhrbrock, R. S., "The History of Job Analysis," *Administration*, Vol. 3, 1922, pp. 164-168.

Uhrbrock, R. S., "Job Analysis in Industry," *Occupations*, Vol. 12, 1934, pp. 69-74.

University of South Florida, Human Resources Institute, Center for Evaluation Research, *Methods for Human Resources in the Criminal Justice System: A Feasibility Study*, (Vol. I of the Final Report: Human Resources in Criminal Justice), Tampa, Florida, June 1980.

University of South Florida, Human Resources Institute, Center for Evaluation Research, *Critiques of Job Analysis Methods*, (Vol. II of the Final Report: Human Resources in Criminal Justice), Tampa, Florida, June 1980.

University of South Florida, Human Resources Institute, Center for Evaluation Research, *Reviews of Job-Related Human Resources Processes*, (Vol. III of the Final Report: Human Resources in Criminal Justice), Tampa, Florida, June 1980.

University of South Florida, Human Resources Institute, Center for Evaluation Research, *Selected Summaries of Human Resources Studies in Criminal Justice*, (Vol. IV of the Final Report: Human Resources in Criminal Justice), Tampa, Florida, June 1980.

Vail, R. G. and Landrigan, R. F., "True Entrance Qualifications and Objective Performance Measures," *EEO Today*, Vol. 5, No. 2, 1978, pp. 129-138.

Van Rijn, P., *Job Analysis of Entry Level Firefighting in the District of Columbia Fire Department: A Duty/Task Approach*, U. S. Civil Service Commission, Washington, D. C., June 1977.

Van Rijn, P., *Job Analysis of Entry Level Firefighting in the District of Columbia Fire Department: Supervisory Perception of the Entry Level Job*, U. S. Civil Service Commission, Personnel Research and Development Center, Washington, D. C., 1977.

Van Rijn, P., *Job Analysis of Entry Level Firefighters in the District of Columbia Fire Department: Administration and Results of the Position Analysis Questionnaire*, U. S. Civil Service Commission, Personnel Research and Development Center, Washington, D. C., 1978.

Van Rijn, P., *Job Analysis for Selection: An Overview*, Office of Personnel Management, Personnel Research and Development Center, Washington, D. C., August 1979.

Ward, J. H., Jr. and Hook, M. E., "Application of an Hierarchical Grouping Procedure to a Problem of Grouping Profiles," *Educational and Psychological Measurement*, Vol. 23, 1963, pp. 69-81.

Walsh, William J., "Writing Job Descriptions: How and Why," *Supervisory Management*, February 1972.

Walther, Regis, "The Functional Occupational Classification Project: A Critical Appraisal," *Personnel and Guidance Journal*, May 1960.

Watson, W. J., *The Similarity of Job Types Reported From Two Independent Analyses of Occupational Data*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1974. JSAS *Catalog of Selected Documents in Psychology*, Vol. 4, (Ms. No. 715), 1974.

Watts, Nancy T., "Task Analysis and Division of Responsibility in Physical Therapy," *Journal of the American Physical Therapy Association*, Vol. 51, No. 1, January 1971, pp. 23-35.

Wegener, E., "Does Competitive Pay Discriminate?," *The Personnel Administrator*, Vol. 25, No. 5, 1980, pp. 38-43.

Weinstein, E. A., "Well-Brewed DOT," *Occupational Outlook Quarterly*, Washington, D.C., 22, 1978, pp. 30-33.

Weiss, D. J., "Multivariate Procedures," In *Handbook of Industrial and Organizational Psychology*, M. D. Dunnette (ed.), Rand McNally, Chicago, Illinois, 1976.

Wendt, George R., "Should Courts Write Your Job Descriptions?," *Personnel Journal*, September 1976.

Wexley, K. N. and Silverman, S. B., "An Examination of Differences Between Managerial Effectiveness and Response Patterns of a Structured Job Analysis Questionnaire," *Journal of Applied Psychology*, Vol. 63, No. 5, 1978, pp. 646-649.

Wheaton, G. R., *Development of a Taxonomy of Human Performance: A Review of the Classificatory Systems Relating to Tasks and Performance*, American Institutes for Research, Washington, D. C, 1968. JSAS *Catalog of Selected Documents in Psychology*, Vol. 3, (Ms. No. 317), 1973.

Wheaton, G. R.; Eisner, E. J.; Mirabella, A.; and Fleishman, E. A., "Ability Requirements as a Function of Changes in the Characteristics of an Auditory Signal Identification Task," *Journal of Applied Psychology*, Vol. 61, 1976, pp. 663-676.

Wheaton, G. R., and Mirabella, A., *Effects of Task Index Variations on Training Effectiveness Criteria*, Naval Training Equipment Center, Orlando, Florida, 1972.

White, J. K., "Moderating Effects of Individual Differences on the Relationship Between Job Characteristics and Worker Responses: A Summary and Comparison of Empirical Investigations," JSAS *Catalog of Selected Documents in Psychology*, Vol. 7, (Ms. No. 1499), 1977.

White, K. K., *Understanding the Company Organization Chart*, American Management Association Research Study No. 56, 1963.

Wiley, L. N., *Analysis of the Difficulty of Jobs Performed by First Term Airmen in II Career Ladders*, Air Force Human Resources Laboratory, Lackland Air Force Base, Texas, 1972.

Wiley, Llewellyn N., "Does Industry Need Task Qualifications Analysis?," *Personnel Administration*, March - April, 1961.

Wiley, Wretha W. and Fine, Sidney A., *A Systems Approach to New Careers: Two Papers*, The W. E. Upjohn Institute for Employment Research, November 1969.

Wilson, David, *A Procedural Guide to an Automatic Data Processing Method of Task Analysis Diagramming*, U. S. Naval Personnel Research Activity, Research Memorandum SRM 69-3, San Diego, California, August 1968.

Wilson, Michael, *Job Analysis for Human Resource Management: A Review of Selected Research and Development*, U.S. Department of Labor, Manpower Administration, Manpower Research Monograph No. 36, Grant No. 21-11-73-40, 1974.

Winefordner, D. W., *Worker Trait Group Guide,* McKnight Publishing Company, Bloomington, Illinois, 1978.

Woodman, Richard W. and Sherwood, John J., "A Comprehensive Look at Job Design," *Personnel Journal,* August 1977, pp. 384-390.

Work in America, Report of a Special Task Force (under auspices of The W. E. Upjohn Institute for Employment Research) to the U. S. Department of Health, Education, and Welfare, M.I.T. Press, Cambridge, Mass., 1972.

Wright, G. H. (ed.), *Public Sector Employment Selection,* International Personnel Management Association, Chicago, Illinois, 1974.

Youngman, M. B., Oxtoby, R., Monk, J. D., and Heywood, J., *Analyzing Jobs,* Gower Press, Teakfield, Ltd., West Mead, England, 1978.

Yukl, Gary A. and Wexley, Kenneth N., *Readings in Organizational and Industrial Psychology,* Oxford University Press, New York, 1971.

Zedeck, S., and Baker, H. T., "Nursing Performance as Measured by Behavioral Expectation Scales: A Multitrait-Multirater Analysis," *Organizational Behavior and Human Performance,* Vol. 7, 1972, pp. 457-466.

Zerga, J. E., "Job Analysis: A Resume and Bibliography," *Journal of Applied Psychology,* Vol. 27, 1943, pp. 249-267.

Zunder, P. M.; Bickford, D. S.; Charron, K.; Jillson, E. H.; and Rose, W. M., *The Utility of a Task Checklist as a Data-Collection Method for Job Analysis,* State of Vermont, Department of Personnel, Montpelier, Vermont, July 1978.

INDEX

INDEX

A

Accommodating
  as an interest, 12, 313
  definition and examples, 317
  recording on Job Analysis Report, 379

Affirmative action, 15

Alien certification studies, 15-16

Alone
  as temperament A, 325

Analyzing
  as a Worker function, 10, 95
  definition and examples, 99-100
  recording on Job Analysis Report, 377

Applications of job analysis, 14-16

Apprenticeship
  as a Job Training Time requirement, 250

Aptitudes, 255-309
  definition, 12, 255
  estimating, 256-257

Arranging tasks for job descriptions, 46-47

Artistic
  as an interest, 12, 313
  definition and examples, 314
  recording on Job Analysis Report, 379

Atmospheric conditions
  as an environmental condition, 13, 349
  definition and examples, 353
  estimating, 349
  recording on Job Analysis Report, 377-378

B

Balancing
  as a physical demand, 13, 331
  definition and examples, 339
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Body of job description
  discussion of, 37
  example of, 421-422

Business detail
  as an interest, 12, 313
  definition and examples, 316
  recording on Job Analysis Report, 379

C

Carrying
  as a physical demand, 13, 331
  definition and examples, 338
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Clerical perception
  as an aptitude, 12, 255
  definition, 284
  examples, 285-289
  recording on Job Analysis Report, 378-379

Climbing
  as a physical demand, 13, 331
  definition and examples, 339
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Cold, extreme
  as an environmental condition, 13, 349
  definition and examples, 350
  estimating, 349
  recording on Job Analysis Report, 377-378

College courses
  as a Job Training Time requirement, 249-250

Color discrimination
  as an aptitude, 12, 255
  definition, 305
  examples, 306-309
  recording on Job Analysis Report, 378-379

Color vision
  as a physical demand, 13, 331
  definition and examples, 345-346
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Comparing
  as a Worker function, 10, 95
  definition and examples, 102-103
  recording on Job Analysis Report, 377

Compiling
  as a Worker function, 10, 95
  definition and examples, 100-101
  recording on Job Analysis Report, 377

Computing
  as a Worker function, 10, 95
  definition and examples, 101
  recording on Job Analysis Report, 377

Concurrent training requirements, 248, 375

Coordinating
  as a Worker function, 10, 95
  definition and examples, 98-99
  recording on Job Analysis Report, 377

Copying
  as a Worker function, 10, 95
  definition and examples, 102
  recording on Job Analysis Report, 377

Crawling
  as a physical demand, 13, 331
  definition and examples, 341
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Crouching
  as a physical demand, 13, 331
  definition and examples, 340
  estimating, 331-332
  recording on Job Analysis Report, 376-377

D

Data
  definition, 98
  listing of Worker functions, 10, 95

Data gathering
  completeness of, 27-29
  difficulties in, 29-30
  methods, 24-27

Data-People-Things concept
  see Worker functions

Data-significant jobs
  preparing job summaries for, 57

Depth perception
  as a physical demand, 13, 331
  definition and examples, 344-345
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Dictionary of Occupational Titles (DOT), 14
  recording title and code on Job Analysis Report, 372
  recording code on Staffing Table, 362

Dimensions of a job, 8-9

Directing
  as temperament D, 322-323

Diverting
  as a Worker function, 10, 95
  definition and examples, 106-107
  recording on Job Analysis Report, 377

Driving-Operating
  as a Worker function, 10, 95
  definition and examples, 113-114
  recording on Job Analysis Report, 377

E

Effort
  as a job evaluation factor, 39

Electrical shock, exposure to
  as an inherent hazard, 13, 353
  estimating, 349
  recording on Job Analysis Report, 377-378

Element
  definition of, 6

Environmental conditions, 349-354
  definition, 13, 349
  estimating, 349
  gathering data on, 28
  recording on Job Analysis Report, 377-378

Environmental conditions form, 386

Establishment
  definition of, 5
  selection of, 21
  study of, 20-33

Explosives, working with
  as an inherent hazard, 13, 353
  estimating, 349
  recording on Job Analysis Report, 377-378

Exposure to weather
  see Weather, exposure to

Expressing
  as temperament E, 325

Extreme cold
  see Cold, extreme

Extreme heat
  see Heat, extreme

Eye-hand-foot coordination
  as an aptitude, 12, 255
  definition, 301
  examples, 302-305
  recording on Job Analysis Report, 378-379

F

Far vision
  see Vision, near/midrange/far

Feeding-Offbearing
  as a Worker function, 10, 95
  definition and examples, 116-117
  recording on Job Analysis Report, 377

Feeling
  as a physical demand, 13, 331
  definition and examples, 342
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Field of vision
  as a physical demand, 13, 331
  definition and examples, 346
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Finger dexterity
  as an aptitude, 12, 255
  definition, 293
  examples, 293-297
  recording on Job Analysis Report, 378, 379

Fingering
  as a physical demand, 13, 331
  definition and examples, 342
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Flag statement, 50-51

Form perception
  as an aptitude, 12, 255
  definition, 280
  examples, 280-284
  recording on Job Analysis Report, 378-379

Frequency of tasks
  see Time percentages of tasks

Functional arrangement of Tasks, 46-47

Functional authority, charting, 61, 70

G

General Educational Development (GED), 229-243
  definition, 11, 229
  estimating, 229

recording on Job Analysis Report, 378
scales of, 230

General Learning Ability
as an aptitude, 12, 255
definition, 257
examples, 257-263
recording on Job Analysis Report, 378-379

Group-interview method, 25

Guide for Occupational Exploration (GOE), 14
recording code on Job Analysis Report, 372
recording code on Staffing Table, 362

H

Handling
as a physical demand, 13, 331
definition and examples, 341-342
estimating, 331-332
recording on Job Analysis Report, 376-377

Handling
as a Worker function, 10, 95
definition and examples, 117-118
recording on Job Analysis Report, 377

Hazards, inherent
as an environmental condition, 13, 349
definition and examples, 353-354
estimating, 349
recording on Job Analysis Report, 377-378

Hearing
as a physical demand, 13, 331
definition and examples, 343
estimating, 331-332
recording on Job Analysis Report, 376-377

Heat, extreme
as an environmental condition, 13, 349
definition and examples, 351
estimating, 349
recording on Job Analysis Report, 377-378

Heavy work
as an overall physical demand rating, 13
definition and examples, 334-335
estimating, 332
recording on Job Analysis Report, 376

High, exposed places, working in
as an inherent hazard, 13, 353
estimating, 349
recording on Job Analysis Report, 377-378

High school courses
as a Job Training Time requirement, 248

Humanitarian
as an interest, 12, 313
definition and examples, 317
recording on Job Analysis Report, 379

Humid
as an environmental condition, 13, 349
definition and examples, 351
estimating, 349
recording on Job Analysis Report, 377-378

I

Industrial
as an interest, 12, 313
definition and examples, 316
recording on Job Analysis Report, 379

Influencing
as temperament I, 323-324

Inherent hazards
see Hazards, inherent

Inplant training
as a Job Training Time requirement, 250-251

Instructing
  as a Worker function, 10, 95
  definition and examples, 105
  recording on Job Analysis Report, 377

Interests, 313-318
  definition, 12, 313
  definitions and examples, 314-318
  estimating, 313
  listing of, 12, 313
  recording on Job Analysis Report, 379

Interview methods, 26-27

J

Job
  as a concept, 6-7
  definition of, 5
  determining number of, 30-33

Job analysis
  applications of, 14-16
  concepts and principles of, 5-7
  conducting studies, 19-33
  definition, 5
  methods of, 24-26

Job analysis components
  definition, 8-9
  definitions of components, 10-13

Job analysis rating
  definition, 8

Job Analysis Report, 371-410
  examples of, 388-410
  forms, 381-387
  procedure for preparing, 371-380
  purpose of, 371

Job analysis study flowchart, 419

Job conditions
  as a job-evaluation factor, 39

Job descriptions, 37-58
  definition, 37
  detail needed in, 40-43
  examples of, 425-429
  parts of, 37-39, 421-424
  style conventions for, 40

Job duties
  see Body of job description

Job evaluation
  as an application of job analysis, 16
  standard factors of, 38-39

Job identification
  as part of job description, 37
  example of, 421

Job requirements
  as part of job description, 38-39
  example of, 422-423

Job restructuring
  as an application of job analysis, 15
  example of, 420

Job specifications
  as an application of job analysis, 15
  also see Job requirements

Job summary
  as part of job description, 37
  example of, 421
  in Job Analysis Report, 373
  preparation of, 53-58

Job titles
  as organization chart captions, 69
  as part of the job identification, 37
  cautions concerning, 7
  recording on Job Analysis Report, 372
  recording on Staffing Table, 361

Job Training Time (JTT), 247-252
  definition, 11, 247
  estimating, 247-248
  gathering complete data on, 28
  recording on Job Analysis Report, 374-375, 378
  sources for determining, 248
  also see Specific Vocational Training

Judgmental factors
- as temperament J, 328
- gathering data on, 28-29

K

Kneeling
- as a physical demand, 13, 331
- definition and examples, 340
- estimating, 331-332
- recording on Job Analysis Report, 376-377

L

Language development
- scale of, 230

Leading-Influencing
- as an interest, 12, 313
- definition and examples, 317-318
- recording on Job Analysis Report, 379

Lifting
- as a physical demand, 13, 331
- definition and examples, 337
- estimating, 331-332
- recording on Job Analysis Report, 376-377

Light work
- as an overall physical demand rating, 13
- definition and examples, 333-334
- estimating, 332
- recording on Job Analysis Report, 376

Line assistants, charting, 70

M

Machines and equipment
- as shown on Workflow Chart, 88-89
- definition, 10
- distinguishing machine actions from worker actions, 7

Machine-significant jobs
- assigning things Worker functions for, 96-97
- preparing job summaries for, 56

Machines, Tools, Equipment, and Work Aids (MTEWA)
- see Work devices

Manipulating
- as a Worker function, 10, 95
- definition and examples, 114-115
- recording on Job Analysis Report, 377

Manual dexterity
- as an aptitude, 12, 255
- definition, 297
- examples, 298-301
- recording on Job Analysis Report, 378-379

Manufacturing processes
- flowcharting of, 77-90

Materials and products
- as described in Narrative Report, 413
- as indicated in workflow charts, 77-90
- as used in job summaries, 56-57
- as used in sentence analysis, 8
- gathering data on, 28
- recording on Job Analysis Report, 374-375

Materials, Products, Subject Matter, and Services (MPSMS), 163-226
- definition, 11, 163
- index, 199-226
- recording on Job Analysis Report, 374-375, 377

Mathematical development
- scale of, 230

Mechanical
- as an interest, 12, 313
- definition and examples, 315
- recording on Job Analysis Report, 379

Medium work
- as an overall physical demand rating, 13
- definition and examples, 334
- estimating, 332
- recording on Job Analysis Report, 376

Mentoring
- as a Worker function, 10, 95
- definition and examples, 103-104
- recording on Job Analysis Report, 377

Methods verbs, 121

Midrange vision
  see Vision, near/midrange/far

Motor coordination
  as an aptitude, 12, 255
  definition, 289
  examples, 289-293
  recording on Job Analysis Report, 378-379

Moving, mechanical parts, proximity to
  as an inherent hazard, 13, 353
  estimating, 349
  recording on Job Analysis Report, 377-378

N

Narrative Report, 413-415
  gathering data for, 22
  outline for, 413-415
  use of outline, 415

Near vision
  see Vision, near/midrange/far

Negotiating
  as a Worker function, 10, 95
  definition and examples, 104
  recording on Job Analysis Report, 377

Noise
  as an environmental condition, 13, 349
  definition and examples, 352
  estimating, 349
  recording on Job Analysis Report, 377-378

Non-machine significant jobs
  assigning things Worker functions for, 96-97
  preparing job summaries for, 56-57

Nonscalar organization chart, 63

Numerical aptitude
  as an aptitude, 12, 255
  definition, 269
  examples, 269-275
  recording on Job Analysis Report, 378-379

O

Observation method, 25

Observation-interview method, 25-27

Occupation
  definition of, 6

On-the-job training
  as a Job Training Time requirement, 251

Operating-Controlling
  as a Worker function, 10, 95
  definition and examples, 112-113
  recording on Job Analysis Report, 377

Organization charts, 61-74

P

People
  definition, 103
  listing of Worker functions, 10, 95

People
  as temperament P, 327-328

People-significant jobs
  preparing job summaries for, 57

Performance on related jobs
  as a Job Training Time requirement, 252

Persuading
  as a Worker function, 10, 95
  definition and examples, 107-108
  recording on Job Analysis Report, 377

Physical demands, 331-346
  definition, 13, 331
  estimating, 331-332
  gathering data on, 28
  recording on Job Analysis Report, 376

Physical demands form, 385

Physical performing
  as an interest, 12
  definition and examples, 313
  recording on Job Analysis Report, 379

Plants and animals
  as an interest, 12, 313
  definition and examples, 314-315
  recording on Job Analysis Report, 379

Position
  definition of, 5

Position Analysis Questionnaire (PAQ), 25

Position-description method, 25

Precision Working
  as a Worker function, 10, 95
  definition and examples, 111-112
  recording on Job Analysis Report, 377

Protective
  as an interest, 12, 313
  definition and examples, 315
  recording on Job Analysis Report, 379

Pulling
  as a physical demand, 13, 331
  definition and examples, 338-339
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Pushing
  as a physical demand, 13, 331
  definition and examples, 338
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Pyramidal chart, 62-63

Q

Questionnaire method, 25

R

Radiant energy, exposure to
  as an inherent hazard, 13, 353
  estimating, 349
  recording on Job Analysis Report, 377-378

Reaching
  as a physical demand, 13, 331
  definition and examples, 341
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Reclining
  as a physical demand, 13, 331
  definition and examples, 337
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Reasoning development
  scale of, 230

Related jobs, performance on
  as a Job Training Time requirement, 252

Repetitive
  as temperament R, 323

Responsibility
  as a job-evaluation factor, 39

Running
  see Walking

S

Scalar organization chart, 62-63

Scientific
  as an interest, 12, 313
  definition and examples, 314
  recording on Job Analysis Report, 379

Sedentary work
  as an overall physical demand rating, 13

461

definition and examples, 332-333
estimating, 332
recording on Job Analysis Report, 376

Selected Characteristics of Occupations Defined in the DOT, 14

Selling
  as an interest, 12, 313
  definition and examples, 316
  recording on Job Analysis Report, 379

Sentence analysis technique
  as used in job summaries, 53-58
  definition and examples, 8

Sequential arrangement of tasks, 46

Services
  flowcharting of, 87-88

Serving
  as a Worker function, 10, 95
  definition and examples, 108-109
  recording on Job Analysis Report, 377

Setting Up
  as a Worker function, 10, 95
  definition and examples, 110-111
  recording on Job Analysis Report, 377

Sitting
  as a physical demand, 13, 331
  definition and examples, 336-337
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Skill
  as a job-evaluation factor, 39

Skill comparability studies, 15-16

Skill level
  arranging tasks by, 46-47

Smelling
  as a physical demand, 13, 331
  definition and examples, 343
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Spatial aptitude
  as an aptitude, 12, 255
  definition of, 275
  examples of, 275-280
  recording on Job Analysis Report, 378-379

Speaking-Signaling
  as a Worker function, 10, 95
  definition and examples, 108
  recording on Job Analysis Report, 377

Specific Vocational Preparation (SVP)
  definition of, 11, 247
  scale of, 252, 378
  also see Job Training Time (JTT)

Staff assistants, charting, 71-72

Staffing Table, 359-367
  definition of, 22, 359
  example of, 366-367
  forms for, 364-365
  procedure for, 359-363

Standard Industrial Classification Manual (SIC)
  as basis for MPSMS classifications, 163
  as Job Analysis Report entry, 373
  as Staffing Table entry, 360-361
  as used in planning for job studies, 20

Standard Occupational Classification Manual (SOC) title and code
  as Job Analysis Report entry, 373
  as Staffing Table entry, 362

Standing
  as a physical demand, 13, 331
  definition and examples, 336
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Stooping
  as a physical demand, 13, 331
  definition and examples, 340
  estimating, 331-332
  recording on Job Analysis Report, 376-377

462

Strenuousness, five degrees of
  definitions of, 332-336
  estimating, 331-332
  recording on Job Analysis Report, 376

Stress
  as temperament S, 326

Supervising
  as a Worker function, 10, 95
  definition and examples, 105-106
  recording on Job Analysis Report, 377

SVP rating
  as Job Analysis Report entry, 378

Synthesizing
  as a Worker function, 10, 95
  definition and examples, 98
  recording on Job Analysis Report, 377

T

Taking Instructions - Helping
  as a Worker function, 10, 95
  definition and examples, 109
  recording on Job Analysis Report, 377

Talking
  as a physical demand, 13, 331
  definition and examples, 342-343
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Task
  definition of, 6
  Task analysis, 14-15

Task analysis inventories, 26, 30

Task descriptions
  see Body of job description
  see Job descriptions
  see Tasks

Task inventories method, 25

Tasks
  arranging for job descriptions, 46-47
  as basis for determining number of jobs at establishment, 30-32
  as basis for preparing job summaries, 53-58
  breaking down jobs into, 43-50
  considerations for identifying, 43-45
  estimating time percentages for, 51-53
  grouping sequential work activities into, 49-50
  grouping similar work activities into, 47-49
  preparing flag statements for, 50-51
  writing style for, 40

Task statements
  see Body of job description

Tasting
  as a physical demand, 13, 331
  definition and examples, 343
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Technical terms
  familiarization of analyst with, 19
  indicating and defining in job descriptions, 40
  indicating and defining in Job Analysis Report, 374
  preparing glossaries of, 415

Temperaments, 321-328
  definition, 12, 321
  definitions and examples, 322-328
  estimating, 322
  listing of, 12, 321
  recording on Job Analysis Report, 379

Tending
  as a Worker function, 10, 95
  definition and examples, 115-116
  recording on Job Analysis Report, 377

Things
  definition, 110
  listing of Worker functions, 10, 95

Things-significant jobs
  assigning Worker functions for, 96-97

463

  preparing job summaries for machine-significant jobs, 56
  preparing job sumaries for nonmachine-significant jobs, 56-57

Time percentages of tasks
  as basis for arranging tasks, 46-47
  as basis for degree of task detail, 41
  as indicator of task importance, 46-47
  estimating, 51-53

Tolerances
  as temperament T, 326-327

Tools, 11

Tour of establishment, 23

Toxic or caustic chemicals, exposure to
  as an inherent hazard, 13, 353
  estimating, 349
  recording on Job Analysis Report, 377, 378

U

Under specific instruction
  as temperament U, 327

V

Variety
  as temperament V, 324

Verbal aptitude
  as an aptitude, 12, 255
  definition, 263
  examples, 263-269
  recording on Job Analysis Report, 378-379

Vertical organization chart, 62-63

Very heavy work
  as an overall physical demand rating, 13
  definition and examples, 335-336
  estimating, 332
  recording on Job Analysis Report, 376

Vibration
  as an environmental condition, 13, 349
  definition and examples, 352-353
  estimating, 349
  recording on Job Analysis Report, 377, 378

Vision, near/midrange/far
  as a physical demand, 13, 331
  definitions and examples, 344
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Visual accommodation
  as a physical demand, 13, 331
  definition and examples, 345
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Vocational courses
  as a Job Training Time requirement, 249

W

Walking
  as a physical demand, 13, 331
  definition and examples, 336
  estimating, 331-332
  recording on Job Analysis Report, 376-377

Weather, exposure to
  as an environmental condition, 13, 349
  definition and examples, 350
  estimating, 349
  recording on Job Analysis Report, 377-378

Wet
  as an environmental condition, 13, 349
  definition and examples, 351
  estimating, 349
  recording on Job Analysis Report, 377-378

Work activities
  definition of, 5

Work aids, 11

Work devices
  as described in Job Analysis Report, 373-374
  as used in job summaries, 56-57
  as used in sentence analysis, 8
  definition, 10-11
  gathering data on, 28

Work diaries or logs, 25

Worker characteristics
  components of, 9, 11-13
  estimates on Job Analysis Report, 378-379

Worker functions, 95-118
  definition, 10, 95
  definitions and examples, 98-118
  estimating, 96-97
  predominant Worker functions, 97
  recording on Job Analysis Report, 377
  structure of, 95-96

Work fields, 121-159
  alphabetical listing of, 122
  combination work fields, 126-127
  definition, 10, 121
  descriptions of, 127-159
  numerical listing of, 123-126
  recording on Job Analysis Report, 377

Workflow charts, 77-90
  as part of Narrative Report, 414
  charting manufacturing workflow, 77-86
  charting nonmanufacturing workflow, 87-88
  components and basic formats, 77-78
  definition, 77
  explanation-of-workflow-chart attachment, 90, 431
  gathering data for, 23

Work performed
  components of, 8, 10-11
  estimates on Job Analysis Report, 377-378

Work setting
  as reflected in job summary, 57